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PRINCIPAL CONTENTS.

American Railroad Journal.

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Saturday, June 29, 1850.

An Essay on Pen and Pocket Cutlery,

Embracing a Detailed Description of the Mechanical, Chemical, and Manual Operations Performed on Certain Raw Materials, to Convert them into the Means, Implements, and Materials, for Manufacturing Pen and Pocket Knives.

BY A. L. HOLLEY.

Continued from page 386.

CHAPTER VI.—CUTLERS. WARE-ROOMS. MATERIAL MAKERS. BRASS—TABLE OF PROPORTIONS. COPPER. ZINC. GERMAN SILVER. BOLSTERS. SCALES. CUTLER'S TOOLS AND IMPLEMENTS. MATERIALS FOR A FOUR BLADE, SHELL HANDLED CONGRESS KNIFE.

Having described the ancient methods of making spring and other knives, and given their history from 1297 to the present time, a period of 553 years, we will look at the business of the cutler, or as now termed handlemaker, which was the original trade, and from which proceeded the three separate trades of forging, grinding and material making, the first two of which have been described (see chapters III and IV,) and the latter will be looked into in connection with handlemaking.

Knife factors are furnished with a material or ware room, and a finishing and packing room, in addition to the apartments occupied by forgers, grinders, cutlers, etc. We first come to the present English method of making a fine, four blade, tortoise shell handled, Congress knife. The blades are taken from the ware room, in the same state as left by the grinder, usually still covered with lime. They are of course partially bright on the face, but dark on the tang's side, and rough on the edges.—The springs are taken as left by the spring forger, rough and imperfectly fitted. The scales, bolsters, shield and shell, are as left by the material maker, and the wire in pieces of several yards length.—The material maker forms the middle and side scales of brass, which is an alloy of copper and zinc. A species of light colored gun metal, called brass, is an alloy of copper and tin, and is often used for mechanical purposes, tools and implements, because harder than copper and zinc, and from the analysis of ancient brass, we find it also to be copper and tin, hard in proportion to the quantity of the latter contained. The elasticity of this metal renders it well adapted to the making of bells.

Pinchback is copper with a very small proportion of zinc, and is frequently "got off" for gold, on to the inexperienced and the verdant. The alloy of copper, tin and zinc is a chemical compound, therefore we have laws and rules for uniting it in the best proportions. The weight of one atom of copper is 8, of tin 7·25, and of zinc 4. The following table exhibits the proportions of the alloys, the color, etc.

Atoms.	Proportion by weight.	Color and use.
Copper+zinc....	1 to 2..	Best for common purposes, and is common brass.
2 Copper+zinc....	4 to 1..	Very malleable, and is used for watch work. Yellow.
Copper+2 zinc..	1 to 1..	Prince metal. Gold color.
Copper+6 zinc..	1 to 3..	Very brittle and hard. Nearly white.
Tin+3 copper...	11 to 36.	Bell metal.
Tin+9 copper...	11 to 108.	Bronze; used for some kinds of machinery.
4 Tin+copper.....	11 to 3..	Coarse, white, and too hard for any purpose.

One method of making brass, is by cementing sheets of copper and zinc by charcoal. The present English method is by melting together copper in round masses, or in bars, with calamine, which is a native oxide or ore of zinc, a native carburet of zinc after combining with oxide of iron, which make it of a redish color, and it usually contains more or less lead. The calamine is powdered and separated by washing, then heated on the hearth of a reverberatory furnace, which expels the volatile matter, usually water and carbonic acid. The remainder is oxide of zinc, and a small portion of carbon, which the heat cannot wholly remove, and some earthy substances. The proportions are nearly equal weights of copper, and calamine, and one tenth of their weight of pulverised charcoal, which are together put into a crucible capable of containing 100 lbs. of brass when completed, but when charged, holding copper 663, calamine 63, and charcoal 13, which is covered with clay, sand, etc., to keep it free from the air. The fire is continued from 12 to 20 hours, when the refuse is poured off, the refuse metal cast into ingots, then usually remelted and cast, to render it better and finer, when it is rolled, drawn, or made into castings for use.

Brass is often made by melting together small pieces of cast copper and zinc, which is made into ingots, then rolled into sheets, slitted, and drawn into wire. For knife scales, sheet brass is used which is not annealed, but stiff and hard. Corrinthian brass, famous in antiquity, was an alloy of gold, silver and copper. Lucius Nummius, 146 years before Christ, captured and burned the city of Corinth, and the violence of the conflagration formed, from the abundance of metals in its course, a solid sea of this alloy in the streets and low places. German chemists make copper of a gold color, by exposing it to the fumes of zinc. The comparative stiffness of this alloy permits it to be cut by saws and files, turned and worked much easier than iron. The metal anciently called brass is the copper of modern times, and the Colossus at Rhodes, and other so called brazen fabrics, were formed entirely of the last named metal. Copper (from Cuprum, a corruption of Cyprium, the island of Cyprus, whence it was formerly brought) was known at a very remote period, and before iron was used this was the chief material for domestic implements and utensils, and weapons of war. The ancients, though they used great quantities of this metal, consumed little compared with the modern nations.

The combining volume of copper is 64, its specific gravity 8·584 after fusion, and 8·953 after it is rolled. Its temperature at the point of fusion, is 2548 Fahr. In its pure state it is a very brilliant metal, of fine red color, and essentially different from every other metal, except titanum. One cubic foot of melted copper weighs 545 lbs., one of native metal 600 lbs., and one of copper medals 620 lbs. A wire of copper, ·078 of an inch in diameter, will sustain 302 lbs. avoir. A bar of cast copper, one fourth of an inch thick, requires 1192 lbs. to break it, but a bar of hammered copper, of the same dimensions, will sustain 2112 lbs. It is very ductile, and highly malleable, and called by turners and copper workers "stringy," and "sticky." It is not an uncommon mineral, and is obtained in Sweden, in arborescent groups, and is found beautifully crystalized. There is in the cabinet of Adjuda, near Lisbon, a piece of the latter, weighing 2617 lbs. In Cornwall, England, and in one of the Faroe islands, beautiful specimens are obtained, with zeolite, imbedded in amigdaloidal trap. The various sulphurets of copper, are the most abundant of its ores, and of these the most so, is copper pyrites, containing copper, sulphur and iron, and of a fine yellow color. The malachite, red ore and others, are usually associated with these in very small quantities. To obtain the pure metal, these ores are roasted in a furnace with connected flues, in which the volatilized sulphur is collected, then fused, which occasions a combination of the oxide of iron in the copper ore with a quantity of silicia, which is usually present, but if not, is supplied, while the iron not melting so easily as copper, is left in the scoria.—The product of this operation is called "coarse metal." This is again roasted at a low heat, which dissipates the remaining sulphur, and oxidizes the remaining iron. After the second fusion a compound remains, containing 60 per cent. copper, and is called "coarse copper," which is exposed to the action of air which passes through the furnace, and the heat is gradually raised to the melting point, and continued from 12 to 24 hours, when it is cast into pigs, and termed "blistered copper." This, covered with charcoal, is often again roasted, to free it from the remaining impurities, and melted and cast till it becomes fine and ductile, and even then it may be alloyed with other easily fused metals, which are not volatile. Hence, the copper of commerce is not perfectly pure, but usually contains lead, and a very little antimony. Copper extracted from its carbonates is purer than that reduced from sulphurets, and a solution of the sulphate is purer than either, the precipitate formed from immersing iron in the solution, being afterwards fused. If the heat is increased above the point of melting, the copper evaporates in a thin invisible smoke, and while in fusion, the color of the surface is a rich bluish green. When exposed to air or moisture, it very gradually becomes covered with a green rust, which may be noticed on the sheets often enclosing the hulls of ships, and when heated red hot, it absorbs oxygen, and is superficially converted into a black oxide, which is the basis of the principal salts of copper, and consists of copper 32, and oxygen 8. It is detected when in very small quantities by the blueish color exhibited, by adding ammonia, and by brown precipitate, with ferrocinte of potash.

Copper mines are wrought in many countries, but those of Sweden are said to produce the purest copper in market. The richest English mines are those of Cornwall, which are veins, traversing the primary rocks of that country. This copper is smelted in Swansea, on account of the scarcity of coal about the mines. The mines of Lake Superior are every extensive and productive, and those of Bristol, Conn., worked by Cornish miners, tho' not extensively, are quite productive, and yield a good article, which is at present ground and smelted in England. Zinc was first discovered in 1520, is first mentioned by Paracelsus, and is often called spelter. It is also termed a semi-metal, because imperfect, and is obtained from calamine its native carburet, or from blende, its native sulphuret.—These ores are roasted, mixed with a carbonaceous flux, and placed in a crucible, or earthen vessel, from the bottom of which passes an iron tube, thro' which the vapor of the zinc is distilled downward, and condensed by water contained in a vessel outside the furnace, at the other end of the tube. At first this vapor emits a brown blaze, and contains arsenic, and often cadmium, but is collected when the blaze is blue. Its color, when cast into ingots, is a light lustrous blue, its texture lamellar and crystaline, its specific gravity 6·896, and after hammering 7·1908. At the common temperature of the air it is tough, and scarcely malleable, when heated to from 212° to 230°, it is ductile and tractable under the hammer, thus exhibiting properties which are remarkable, considering its texture, at 500° is brittle, and may be pounded fine in a mortar, and fuses at about 700°, before it is red hot. After it is once superficially covered with a black oxide, it resists the farther action of moisture, but occasions the rapid evolution of hydrogen gas when under water, if a little acid is present, or the zinc is impure, which causes it to be such a powerful generator of electricity, and so valuable in the voltaic pile. It is used in the curious art of transferring printing called xincography, is combustable for a short time at a moderate heat, but on account of the interference of the oxide which is formed, can only be burned up at a white heat when the vapor burns with a very intense white flame, and yields pompholix; a flocculent oxide, which floats in the air, and is often called philosopher's wool, or nihil album.

To return to our knife: the scales are formed from sheet brass by cutting it across the grain, into pieces as long as the knife, "slitting" these pieces with shears furnished with gauges, so that the grain may run lengthwise of the knife, both ends of each strip are perforated by a hand punch and hammer, on a block of lead or wood, and are then ready for the bolsters. These are cast from German silver, which is an alloy of copper, zinc and nickel, and is probably much the same as the Chinese "packfong," or white copper, though the latter is said by Dr. Fife to be a compound of iron, copper, zinc and nickel. Dr. Feuchtwanger, who first introduced and manufactured German silver in this country, "composed the alloy of one part of nickel one of spelter, and three of copper," and this well made is worth from $1 25 to $1 50 per pound, and prepared from pure metals will not tarnish, but is equal to stirling silver in whiteness. The refractory nature of nickel, and the difficulty of obtaining it free from arsenic, iron and cobolt, often make the silver of a yellowish color. The Doctor, however, disowns all fellowship with this yellow compound, which returns the manufacturer a good profit when sold for best German silver, at 75 cents per pound. It is sometimes an alloy of 7 parts zinc, 2·5 copper, and 6·5 nickel, and then more nearly resembles "packtong," if not the same material. Upwards of 50,000 lbs. of this compound is annually made in America, for which the nickel is imported from Europe, as there are but three localities of nickel in this country; an ore from Chatham, Ct., yields about three per cent., and one from LaMotte, Mo., ten per cent. nickel, and it has lately been discovered among the copper mines of Lake Superior.—These ingredients are not easily made to mingle, and only unite when quite pure, and subjected to intense heat. The zinc, which is of a volatile nature, is not placed in the crucible till the other metals are well mixed. The compound is cast into ingots, rolled, or slitted and drawn into wire.

In 1836, Dr. Teuchtwanger petitioned Congress for permission to issue German silver cents, to the amount of $30,000, as a substitute for copper currency. The proposition was strongly advocated by Messrs. Adams and Benton, and met the approbation of Mr. Van Buren, the President, and the members of Congress; but the director of the Mint said that the U. S. government had the exclusive right of coinage, and that it required much skill to analyse German silver: so the proposition of course "fell through."

Bolsters are cast from this metal, in moulds of sand, connected together in strips containing from four to twelve, but on account of the difficulty of properly melting and keeping it in a liquid state, but few can be cast in one piece, as it soon clogs, runs slowly and makes imperfect castings. A short thick pin is formed on the flat side of each bolster. The strips are filed on the edge which meets the covering, till even and straight, and then cut apart by a chisel. The hole of the scale end, is slipped over the pin of the bolster (which lies on an anvil) and this pin is partially riveted over the brass by a stroke of the hammer. When all the scales are supplied with bolsters, they are taken to another anvil, the bolsters laid separately in a steel boss (which is a small anvil with an indented surface), and hammered till the brass and silver are driven together as a solid piece, the pin completely riveted down over the scale, and the shape of the bolster perfected. In this state they are taken by the cutler. The middle scales are of brass, and the same as the side scales before the ends are perforated.—The shield is cut from very thin sheets of German or common silver by a "die,"—a mortice in a steel plate on which the metal is laid, and a "punch," which fits, and when pressed downward, carries the shield before it through the mortice.

The shell is the scale of a testaceous animal commonly called the tortoise, belonging to the genus testudo. All cheloman reptiles are distinguished by the peculiar armature, consisting of the upper and lower buckler united at the edges, and permitting only the head and tail to appear externally. The upper shell is called the carapace, and formed by eight pairs of ribs united by toothed sutures, and having bony plates adhering to the annular portion of the dorsal vertebrae, and so connected as to be motionless. The lower shell is called the plastron, and generally composed of nine portions, which answer for the sterrium. There are many peculiarities in the structure of this animal, and Baron Cuvier says regarding it, "un animal retourne."—The chelonians respire by the play of the mouth, have no teeth, and but very limited powers of locomotion, and move with a slow awkward gait.—They are very tenacious of life, will live without food for years, and walk about for several weeks *without any head.* The most common of European tortoises is the Greek tortoise, which lives on fruits and insects, and sleeps thro' the winter. The scales are granulated in the centre, striated on the margin, and spotted with a rich black, or dark red, and

a transparent bright yellow. One has been known to reach the good old age of 120 years, when it died of neglect. The scales of this animal are taken off in sheets, and in this state they are imported. The sheets are sawn up into strips by the material maker, and are then ready for the cutler. Wire of any size is made by drawing strips of metal through a circular hole in a steel plate. These are the materials, and must be made up into knives by patterns, which consist of a steel "plate," shaped and drilled like the intended knife, a "fitting tang," shaped and drilled as the blade tang should be, and a "fitting spring," the end alone of which is the pattern. All these are hardened so as not to waste by a file. The materials are placed on a board, say 24 by 5 inches, with sides one half an inch high, which is termed the "knife board," and on which the work is kept and carried about.

The cutler's "side," as he terms it, is a bench from 5 to 6 feet long, and from 18 to 24 inches wide. A portion of the bench, 2 feet in length, is raised from 6 to 10 inches above the main bench, on the left end of which is a vice. A steel faced anvil, called a "steady," 4 inches high and 2x2 inches on the face, is set in the lower bench some 6 inches from the vice. The front surface of the steady projects one half an inch over the body, and has in it a mortice and a small circular hole. The hammers usually number 3, the largest of which weighs about 8 oz., the second 3 or 4 oz., and the smallest 1½ to 2 oz.; and those weighing only ¼ oz. are occasionally used. The other tools and the mode of operation will be described in the next chapter.

For the American Railroad Journal.

In No. 14 of the current volume of the Journal, I gave a simple formula for obtaining a modulus of strength for bridge trusses, showing the greatest length to which a truss of any given materials, plan and proportions, could be extended before the full strength of the materials became exhausted by the weight of the truss itself, and affording a means of comparing the relative strength of different trusses and plans of trussing. The formula is $\frac{t+w}{t}\times l$=modulus, t representing the weight, and l the length of the truss, and w its breaking weight, or load.

Applying the formula to cast iron girders of a parallelopipedal form, I showed the modulus to be 1334, for a length of girder equal to 12 times its depth, and 1601, for a length equal to 10 times its depth.

For the English wrought iron tubular bridges and girders, according to Mr. Fairbairn's formula for the breaking weight, applied to the proportions of the Conway tube, the modulus is 1654·4.

To pursue the subject, a piece of straight grained white pine, one foot long and one inch square, will break with a uniformly distributed load of about 1000 lbs., and will weigh 3 ounces. Applying the formula, it becomes $\frac{3\text{ oz.} + 1000\text{ lbs.}}{3\text{ oz.}}\times 1$ ft. $=5334$. Hence a clear straight beam of well seasoned white pine, with a depth equal to one-twelfth of its length, would bear its own weight at more than a mile in length.

But beams in those proportions cannot be obtained of more than 15 or 20 ft. without great expense, while beams of greater proportionate length possess so much flexibility as to be unsuited to the bearing of heavy loads, although their absolute strength is very considerable.

The loads which girders of the same breadth and depth of section can sustain, are inversely as the lengths, and the weights of such girders directly as the lengths. Hence the depth being the same, the modulus is inversely as the square of the length.—In the above case, then, the modulus for a beam of a length of 12 times its depth being 5334, the modulus for 24 times the depth is $\frac{1}{4}\times5334=1333$, and for 6 times the depth $4\times5334=21336$.

But my object is principally to consider the subject of *trusses*, composed of numerous pieces, proportioned, arranged and connected so as to form systems capable of bearing loads when simply supported at the ends, in the same manner in which girders or beams are commonly used, and secured from swaying or crippling laterally. I propose to apply my formula to the Howe truss, the plan being a prominent one, and familiar to engineers generally in this country.

I have seen no account of the breaking of a bridge or model of this kind by loading beyond the absolute strength of the materials. But by selecting certain important parts of known strength, and computing the distributed load necessary to produce a strain on those parts equal to their utmost ability to bear, of course the load so determined will be the true breaking weight, on the supposition that the parts selected are the weakest as compared with the service required of them.

I will take a truss of 150 feet, in the proportions usually adopted in those bridges, as nearly as I have the means of stating them; bottom chord 2 square feet, top chord 1·75 square feet in cross-section, and braces 7″ by 8″. Upright bolts, 2 of 1¼ inch iron, once in about 10 feet, and cast iron butting blocks to receive the thrust of the braces.—Space between upper and lower chords about 18 ft.

Now, one pair of bolts at 10 feet from each end, contain about 7½ square inches cross-section in the four, besides what is cut away by the screw thread, and at 60,000 lbs. to the inch, can bear $60,000\times7\frac{1}{2}=450,000$ lbs. And since these four bolts sustain the whole load, except one-half of what comes on the two endmost pannels, say one-fifteenth part of the whole, it is obvious that the capacity of those four bolts, increased by one-fifteenth part of the same, is a *limit* to the capacity of the truss, if it does not exceed it. Therefore the breaking weight for the truss in question does not exceed $450,000\times\frac{16}{15}=480,000=t+w$.

Then, for the weight of the truss, t, say 45 braces and counter-braces, 20 ft. 8″×7″, 4230 feet, b. m.

Top and bottom chords		6750
Making say 11,000 ft. at 2½ lbs		27,500 lbs.
30 bolts and nuts 20 ft., 1¼″ iron	175 lbs.	5,250
30 wrought plates under the nuts	15 lbs.	450
30 cast blocks	50 lbs.	1,500
Small bolts, etc., say		300
Total		$35,000=t$.

The modulus then equals $\frac{480,000}{35,000}\times150=2056$, or less.

A model truss of mine, 4 feet long, with a depth equal to one-tenth of its length, made of pine fastened with iron, and weighing nine-tenths of a pound, was tested with a load of 600 lbs., without breaking it, though it showed symptoms of yielding in the top chord, which was not so thoroughly staid laterally as it would be in a complete bridge. But taking 600 for the breaking load, the modulus is $\frac{600\cdot9}{0\cdot9}\times4=2670\frac{2}{3}$.

Now, though this modulus is about 30 per cent. greater than that obtained for the Howe truss, it will be observed that the latter has some 25 per ct. more relative depth of truss than the former, which is equivalent to 10 or 12 per cent. advantage in the modulus, besides that every thing uncertain in the data has been presumed in favor of the other, and adverse to mine, unless it be that *perhaps* the specific gravity of the timber in my model was less by a trifle than that of the other was estimated to be.

Rider's Iron Bridge.—The truss of this bridge has a top stringer and vertical posts of cast iron, with a bottom stringer and diagonals of wrought iron.

A three trussed model, six feet long, said to contain 18 lbs. of iron, including iron traverse beams and lateral bracing, failed in the centre truss with a load of 2000 lbs.

Now, allowing that the middle truss weighed 4 lbs. and bore half the above load, the modulus would be $\frac{1004}{4}\times6=1506$.

The first bridge built by the N. York Iron Bridge Company over the Buffalo creek, on the same plan 160 feet long, broke with about 70,000 lbs., I believe, in addition to the weight of the iron and timber work of the bridge. I estimate the iron in the centre truss at about 25,000 lbs., timber work sustained by that truss 56,000, and half the load of 70,000 lbs., equal to 35,000—making altogether 116,000 lbs.$=t+w$. The modulus then is $\frac{116,000}{25,000}\times160=742$. Calculations made by me on examining the work, showed that the parts broken must have been subjected to a stress very nearly equal to the absolute capacity of the materials to bear. It was therefore a fair, and not an accidental failure. It is possible, however, that the load was not favorably distributed to enable the truss to act to the best advantage.

The new bridge at the same place, finished about a year ago, has 3¾ square inches cross-section in the lower stringer, besides what is cut off by bolt holes. The stress upon the centre of this stringer is equal to one-eighth part of the distributed load, $(t+w)$, multiplied by the length (160), and divided by the depth (15), of the truss. The stringer, moreover, *may* be assisted in the centre by one pair of diagonals on each side of the centre, *possibly*, and *barely* possibly, to an amount which is to the whole strength of two of those diagonals, as their horizontal run is to their length, or about as 2 to 3. And these diagonals, being 2″×½″, the utmost assistance they can afford is equal to the strength of two square inches of iron, making the stringer, assisted to the utmost by the diagonals, equal 5¾ inches, and capable of a stress of $5\cdot75\times60,000=345,000=\frac{1}{8}(t+w)\times\frac{160}{15}=\frac{4}{3}(t+w)$, whence $t+w=\frac{3}{4}\times345,000=258,750$. The modulus, therefore, estimating t at 35,000 lbs. equals $\frac{278,750}{35,000}\times160=1182$.

A very high degree of accuracy cannot be claimed for these results, owing to a want of exactness in the data, but they may certainly be relied on as not very remote approximations to the truth, and it may safely be inferred that the Rider truss, as usually proportioned, has a modulus not exceeding from 1000 to 1500.

Trumbull's iron bridge of 80 feet, over the Erie canal at Frankfort, has in each truss two reversed

curve suspension rods of 1¼ inch iron, and a 1¼ in. rod running horizontally along the bottom of the truss. These three rods, with an aggregate cross section of about 4·76 inches, capable of a stress of $4{\cdot}76 \times 60{,}000 = 285{,}600$ lbs., constitute the power of the positive or tension side of the truss; and the truss being about 7 feet high, the distributed load due to this am't of stress on these parts is $\cdot 7 \times 285{,}600 = 200{,}000$, nearly, and equal to $t+w$, upon the not very probable supposition that the curved and horizontal rods can be adjusted to an uniform tension of 60,000 lbs. to the inch, and that this is the weakest part of the truss.

But the upper chord or stringer of cast iron pieces not stronger than square bars with a width of side equal to one thirty-sixth of their length, cannot, under the most favorable circumstances, be estimated as capable of bearing a negative strain greater than 30,000 lbs. to the square inch. The cross-section being about 6 square inches only, could not sustain over 180,000 lbs. pressure, requiring a load of 126,000 lbs.

Now the truss weighs probably at least 7000 lbs., and the modulus, therefore, would be $\frac{126{,}000}{7000} \times 80 = 1440$, and could not exceed $\frac{200}{7} \times 80 = 2285$, before the positive side would be exhausted. The modulus, then, cannot reasonably be reckoned more than 1800.

This exceeds that obtained for the Rider truss.—But it is to be remarked that while the latter is well calculated to sustain the effects of an unequal distribution of load, the former is deficient in the necessary requisites to endure such conditions.

Now, the above appears to be about a fair index of what has been accomplished in the various essays at iron truss bridge building, (except mine) either in Europe or America, as far as the results have come to my knowledge. If any thing better has been achieved, I should consider myself obliged by being put in the way of becoming acquainted with the evidence of it.

But this comes very much short of what *may be*, and what I *have* done, with wrought and cast iron combined in bridge trusses. I have built some 20 iron bridges, from 25 to 100 feet in length, for both common roads and railroads, and the moduli of my trusses, estimated on more certain, and less liberal bases than have been assumed in the cases above considered, range from 3000 to 5000; and even these results fall considerable short of the utmost capabilities of those materials, under the most favorable circumstances.

S. Whipple.

Utica, June 25, 1850.

From the Glasgow Practical Mechanics Journal.

A Chapter in the History of Railway Locomotion.

Continued from page 387.

After the conclusion of their investigations, and previous to the issue of their report, these gentlemen made application to Mr. Hackworth for particulars of the expenses connected with the maintenance of the locomotive engines of the Darlington line, and when the report appeared, it contained their well known decision in favor of stationary power.

Mr. Robert Stephenson was at this time carefully searching for evidence to support him in his opinion in favor of the locomotive system, in opposition to the report. A letter from him to Mr. Hackworth, dated May 17, 1829, refers particularly to this question:—

"The reports of the engineers who visited the north, to ascertain the relative merits of the two systems of steam machinery now employed on railways have come to conclusions in favor of stationary engines. They have increased the performance of fixed engines beyond what practice will bear out, and, I regret to say, they have depreciated the locomotive engines below what experience has taught us. I will not say whether these results have arisen from prejudice, or want of information or practice on the subject. This is not a point which I will presume to discuss. I write now to obtain answers to some questions on which I think they have not given full information. Some of their calculations are also at variance with experiments that have come under your daily observation. For instance, they state it positively as their opinion, that a locomotive engine of 10 horse power, or say, of the usual size, will not convey more than 10 tons, exclusive of the wagons, at the rate of 10 miles per hour in winter time, and in summer the same engine will take 13½ tons. The calculation is made on the assumption of the road being level. In answer to this statement, will you be kind enough to state at what speed your own engine returns from Stockton with a given number of empty wagons, and the rates of ascent? The whole ascent will do to get an average. State also at what speed the six-wheeled engine made by R. S. & Co. will return with any given number of wagons. What load, including wagons, will an engine, weighing 9 tons, including water, take at the rate of 10 miles an hour on a level well-conditioned railway? Let it be understood that all your statements are made under the supposition that the speed is to be maintained for 20 or 30 miles without stopping, except for water. Let me have your general opinion as to the locomotive engine system. Is it as convenient as any other? Would you consider 13½ tons in summer, and 10 tons in winter, a fair performance for a good locomotive engine? You will oblige me much by answering the above questions as promptly as possible, as the discussion on the merits of the two systems is yet going on amongst the directors here."

The reply to the above letter, in answer to the several questions propounded, was the following:

"The statement you allude to, that a complete locomotive will take but 10 tons at 10 miles per hour, is quite at variance with facts: as an opinion merely, this I would forgive. Four of our wagons, laden for depots, frequently take from 12 to 13 tons of coals, exclusive of the wagons. Our engines never take less than 16 laden wagons in winter, and in summer from 20 to 24 and 32 laden, and can maintain a speed of 5 miles per hour, except in case of stoppages by means of horse wagons at the passing places. Engines thus loaded have frequently travelled at 9 miles per hour, sometimes more. It is unsafe to aim at speed upon a single line of railway, the danger is at the passing places. I am verily convinced that a swift engine, upon a well conditioned railway, will combine profit and simplicity, and will afford such facility as has not hitherto been known.

"I am well satisfied that an engine of the weight you mention, will convey, on a level, in winter, 30 tons of goods, 10 miles per hour, exclusive of carriages, and 40 tons in summer exclusive of carriages. The six-wheeled engine fitted up at the company's works; generally takes 24 wagons, 53 cwt. to 3 tons of coals each, speed 5 miles per hour, empty wagons 24 cwt. each. The 6 wheels by R. Stephensou & Co.—20 wagons, 5 miles per hour, weight as above.

"As to my general opinion as to the locomotive system, I believe it is comparatively in a state of infancy. Swift engines upon a double way, I am convinced, may be used to the utmost advantage. Improvements upon anything yet produced, of greater importance in all respects, are clearly practicable; and I am sure this will prove itself by actual remuneration to such parties as prudently, yet diligently, pursue the execution of this kind of power, with their eyes open to those alterations and advantages which actual demonstration of local circumstances point out.

"Stationary engines are by no means adapted to a public line of railway. I take here no account of a great waste of capital. But you will fail in proving to the satisfaction of any one, not conversant with these subjects, the inexpediency of such a system. It never can do for coaching; passengers cannot be accommodated. If endless ropes are used, there will be both danger and delay. What provision can be made to answer the stretching of ropes? I have known a rope a mile and a quarter long, stretch 70 fathoms in one day. What set of apparatus will be found practically applicable to give the rope proper tension? Admit it to be possible, who would dare to be near when a mass of matter standing at rest, say 20 to 30 tons, is first put in motion by a rope, moving at the rate of 10 to 15 miles per hour—It need not be added what will follow—a scene of endless confusion!

"I hear the Liverpool company have concluded to use fixed engines. Some will look on with surprise; but as you can well afford it, it is all for the good of the science and of the trade to try both plans. Do not discompose yourself, my dear sir; if you express your manly, firm, decided opinion, you have done your part as their adviser. And if it happen to be read some day in the newspapers—'Whereas the Liverpool and Manchester railway has been strangled by ropes,' we shall not accuse you of guilt in being accessary either before or after the fact."

There was still considerable indecision in the matter on the part of the directors, although considerable partiality was evinced by the major portion of them in favor of the locomotive, provided engines of this class could be built of sufficient power, whilst their weight was kept below that of the existing engines, some seven or eight tons; and in conformation with the railway act, requiring that no smoke should be discharged.

To distinguish accurately what was the cause of this favorable leaning of the directors towards the locomotive system, after the very opposite evidence which they had received, may, perhaps, be deemed a straining of the point; but there is good room for the presumption, that the evidence supplied by Mr. Hackworth, through Mr. Robert Stephenson, in the letter which we have quoted, had considerable influence in determinining their choice. No other person had at this period anything like the practical knowledge which he possessed, in reference to the working of railways by both systems, the relative merits of which he had fully tested on the Darlington line.

One of the directors—Mr. Harrison—having given it as his opinion, that the expectancy of a reward, to be offered to the public as an excitement to competition, would have the desired effect—this mode of procedure was at length adopted; and, in April, 1829, they offered a premium of £500 for the

best locomotive engine, conformable with certain regulations and conditions. The story of the competition—in which Mr. Hackworth joined—with the results of the test of the different engines, has been often told.

It is to be regretted that Mr. Hackworth, as an agent of the Stockton and Darlington company, had not more extended means for the more perfect accomplishment of his designs; and that only such time as could be snatched from their service, could be devoted to his own plans. As the company's means were little more than adequate to the repairs of their own plant of engines, a great part of the work in his trial engine was executed at other establishments—the boiler being made at the Bedlington Iron Works, and the cylinders by Messrs. Stephenson.

The "Sanspariel" had a cylindrical boiler, 6 feet long, and 4 feet 2 inches diameter, one end being flat, and the other hemispherical. The heating surface consisted of a double tube traversing the whole length of the boiler, and returning to the fire end; the fire grate and chimney being both at one end of the engine—the fire grate in one tube, whilst the chimney terminated the other. The tube extended from the boiler to a length of about 3 feet, with a casing of a semi-circular form surrounding it at the fire end, except at the chimney, where this casing extended only 2 feet. With this arrangement, a greater extent of heating surface was obtained, than if tubes limited to the boiler's length had been used. The length of the grate bars was 5 feet, and the diameter of the tube at the fire end 2 feet, reduced to 15 inches in the return tube, this being also the size of the chimney. The area of the fire grate was ten square feet; the area of the surface of water exposed to the radiating heat, or direct action of the fire, being 15·7 square feet; and that acted on by the carried heat, 74½ square feet. She was carried on four wheels, four feet 6 inches diameter. The boiler was very imperfect as a piece of workmanship, and considerable leakage resulted. To such an extent were the joints defective, that many of them had copper run in and calked up to make them steam tight. Of the cylinders the same may be said—six castings were made before two perfect ones were got. The sixth cylinder had to be substituted at Liverpool, immediately after the contest at Rainhill, the fifth having burst during the competition. The imperfection in this case, was in the metal forming the partition between the bore of the cylinder, and the port way or steam pipe along the cylinder side, which had been cast and bored so thin in one part, as to leave less than 1-16 inch of metal. The consequence was, that the engine had no sooner commenced working than the cylinder burst, when the race had to be run with one perfect cylinder only, whilst the fracture of the other one opened at every stroke a direct communication between the boiler and the chimney. Not only did this mal-adventure render the "Sanspareil's" case hopeless, by a tremendous loss of steam, but as each burst took place when the steam slide opened the communication with the injured cylinder, a great quantity of fuel was ejected from the fire grate. It is obvious that, under these circumstances, the "Sanspareil" had little chance against the "Rocket"—Messrs. Stephenson's engine—which was perfect in all its constructive details. As it was, the only superiority of the latter was in her economy of fuel. The trial run, indeed, was not of such a character as fairly to test the two engines—the distance being no more than 1½ mile. The blast pipe of the "Sanspareil" was fitted to enable her to maintain her working pressure during a long journey; whilst the "Rocket," unprovided with this appendage, was capable of generating steam as well when at rest as when in action. Thus the latter was enabled to get up a sufficiency of steam for her run, previous to starting, and when brought to stand at the stations, regained the steam power lost during the run, which was well performed on so short a distance as 1½ mile. This would not have been the case in the regular journeys of a working line.—Such a test, therefore, was practically worthless, in arriving at a due comparison of performance for a line of considerable length, like the Liverpool and Manchester.

To be continued

Terrestrial Magnetism.

When a magnetised needle is freely suspended by a silk thread at its centre of gravity, it will be found to point one of its extremities in the direction of the north pole of the earth. But at most places on the earth's surface its direction does not coincide, and therefore forms an angle with the geographical meridian. This variation from the geographical meridian is termed the *declination* of the needle. Moreover, it is only at a few places that its direction is in the plane of the horizon; it is generally found to point in a sloping direction towards the earth, and the angle of divergence from the horizontal plane is termed the *inclination*, or dip. Again, it is found that the needle is not everywhere attracted with the same energy. The intensity of total magnetic force, as it is termed, is measured by the power with which, when withdrawn from its position of equilibrium, it strives to return to it. The magnetic state of any place is not deemed determined until these three elements—the declination, inclination, and intensity—are precisely ascertained. It has been estimated by Gauss that the total magnetic power of the earth, compared with that of a saturated steel bar, 1 lb. in weight, is as 8,464 millions to one; and supposing it to be evenly distributed, the force in every cubic yard of the earth's mass will be equivalent to that of six such bars.

1. *Declination.*—There are certain points on the globe where the direction of the needle exactly coincides with the geographical meridian, and lines which connect such points with each other are termed *lines of no declination.* Lines which connect points where the needle is deflected by the same angle from the geographical meridian, are called *isogonal* lines. Such lines on a sphere, which may be termed magnetic meridians, are curves of double curvature. They are not parallel with each other, but are bent into unaccountable flexures. Most of them are found converging towards a point in each hemisphere—one being near Baffin's Bay, and the other to the southward of Van Dieman's Land. The changes of declination in sailing along some geographical meridians is so rapid, that it has been proposed, where the indications of the chronometer cannot be trusted, to determine the longitude by means of the compass. Sir James Ross, whilst voyaging in the Antarctic Ocean, once noticed a change in the declination from 114° west, in a space of about 360 miles.

2. *Inclination.*—A line drawn through those points where the needle's direction is parallel with the plane of the horizon is termed the *line of no dip*, or the magnetic equator. It forms a curve of double curvature, and, cuts the earth's equator at two places. To the north of this line the needle inclines its northern extremity more and more, until, at the north magnetic pole (70° north latitude, and 95° 39′), it points vertically downwards. On the other hand, to the south of this line the southern extremity of the needle is pointed towards the earth, and at the south magnetic pole (75° 5′ south latitude, 154° 8′ east longitude), it is again in a perpendicular position. "As we approach the magnetic equator," says Sir James Ross, "our observations relative to this interesting question were more frequent. We had watched the progressive diminution of the dip of the needle, and, steering a course as nearly south as the wind permitted, in order to cross the line of no dip at right angles, we found the change so rapid as to be ascertained with great precision; so much so, that the signal for our being on the exact point of no dip—where the needles, being equally poised between the northern and southern magnetic systems, assumed a perfectly horizontal position—was being hoisted from both ships at the same instant of time. It could not fail to be of more than ordinary interest to me to witness the needle thus affected, having, some years previously, when at the north magnetic pole, seen it in a directly *vertical* position; nor was it unnatural, when we saw the south pole of the needle beginning to point below the horizon, to indulge the hope, that ere long we might be permitted to see it in a similar position at the south magnetic pole of the earth. The regularity as well as the rapidity with which the alterations of dip occur is also worthy of notice. At 280 miles north of the magnetic equator, the dip was 9° 36′, showing about 2·05 minutes of change for every mile of latitude; at 292 miles to the south, the dip was 9° 52′, or about 2·03 minutes for every mile of latitude. It is to be remembered that this large amount of change is limited to the region of the magnetic equator; near the poles it requires an approach of about two miles to produce an alteration of a single minute of dip." The magnetic poles, it will be noticed, do not coincide with the geographical poles. Lines which connect points, where the dip of a needle is the same, are termed *isoclinal lines.*

3. *Intensity.*—It was formerly supposed that the intensity of the force which determines the magnetic declination and inclination is at a minimum, where the dip of the needle is zero, *i. e.*, where the needle is parallel with the plane of the horizon.—But this is not the case; and hence, since Humboldt selected the magnetic intensity at a certain place in Peru, where the needle took a horizontal position as the unit measure, it has become necessary, when his scale is adhered to, to employ expressions less than unity to denote the intensity at many places where the magnetic force is more feeble, although the deviation from the horizon is greater.

Researches, says Sabine, into the amount of the magnetic forces at different points of the earth's surface, the graphical representations of the results by lines drawn through the points where the force has an equal intensity (*isodynamic lines*), have shown that there are two foci, or points of maximum force, in each hemisphere, and consequently four on the whole surface of the globe. The isodynamic lines which surround each of the two points of maximum in a hemisphere are not circles, but are of an ovate form, having the larger axis in a direction which, if prolonged, would connect the two foci by the shortest line, or nearly so, which can be drawn between them on the surface of the globe. As the ovals successively recede from the focus, they correspond to weaker and weaker degrees of force, each in its turn enclosing the ovals of higher intensity. This continues to be the case until the two systems of ovals encounter in a point intermediate between the foci. The isodynamic line which corresponds to the force at this point, has, consequently, the form of a figure of 8, each of the loops enclosing a focus with its surrounding ovals. This form is called by geometricians a lemniscate. There is but one such isodynamic line in the extra-tropical part of each hemisphere, and it separates the isodynamics of higher intensity than itself which are within the loops, each surrounding a single point of maximum only, from those which correspond to weaker degrees of force than that of the lemniscate, and are exterior to it. Each of the exterior isodynamics surrounds both the foci, but without meeting or crossing in the point between them. Their general form is that of parallelism with the external figure of the lemniscate, but the inflections which produce the double loop become progressively less marked in the isodynamics of weakest force.

If the two foci in a hemisphere (continues Sabine) were points of equal force, the ovals surrounding each would be similar in force and area, and the point at which the two systems would encounter each other would be half way between the foci. Such, however, does not appear to be the case. The intensity at one of the foci is greater than at the other; it is so in both hemispheres, and the ratio of the force at the major and minor focus appears to be nearly the same in both. The two

major foci—one in the northern, the other in the southern hemisphere—are not at opposite points of the globe to each other, nor are the two minor foci. The foci in each hemisphere are not separated from each other by an equal number of degrees of geographical longitude; they are nearer to each other in the southern than in the northern hemisphere.

None of the foci of maximum intensity is coincident with the spot in which the direction of the needle is vertical. In the northern hemisphere, the geographical position of the focus of maximum intensity is in latitude 52° 19·3, longitude 268° 0·1.

In passing from the north to the south magnetic hemisphere, there is upon every meridian a point up to which the intensity gradually diminishes, and from which, in continuing a southward progress, it begins to increase. The line uniting these points is one of various inflection, and in it occurs the point of minimum total intensity, or the place whose magnetic intensity is exceeded by that of every other place on the earth's surface.

The mode of measuring the magnetic force in parts of an absolute scale, instead of in Humboldt's manner, has of late been adopted in consequence of its enabling present determinations to be compared with future ones. In this scale the unit of force is that amount of magnetic force required to generate the unit of velocity in the unit of mass during the unit of time. If a British foot, grain, and second, be taken to represent these units, the ratios of force at the major and minor foci in the northern hemisphere are 13·9 and 13·3; in the southern hemisphere, 15·6 and 14·8. At St. Helena, which is nearly in the line of least intensity, the value of the force is 6·4.

Variations in the Position of the Needle and in the Intensity of Magnetic Force.—Such variations as depend upon changes of place have been already mentioned, but there remain to be noticed those variations which have reference to time.

Periodical Movements.—In every 24 hours the needle is found to make two deviations to the eastward, and two to the westward, of its mean position, those which take place in the day being greater than those occurring in the night. The extent of the deviation is greater in summer than in winter. Finally, a fluctuation having an annual period has been discovered. The angle of dip has been found to vary in a similar manner; and the intensity of total magnetic force is likewise subject to fluctuations of the same character. These fluctuations are attributed to electric currents caused by changes in the amount of heat communicated by the sun to the earth and its atmosphere.

The amount of diurnal variation decreases as the magnetic equator is approached.

The diurnal variations in the southern hemisphere are in a direction opposite to those in the northern. Hence it was thought probable that there might exist a line where these diurnal variations are no longer observable. But it appears from observations, made at stations which were suitable for determining the question, that those variations, which are peculiar to each hemisphere, prevail at opposite seasons of the year, apparently in accordance with the position of the sun with relation to the earth's equator.

Secular Variations.—In the periodical displacements, the movement of the needle at one time is compensated by a counter movement at another.—But it has been found that, after allowing for movements of short period, there still remains a small displacement of the needle, by which its mean position is slowly advancing in one direction. Hence all the magnetic curves are slowly but regularly changing over the whole surface of the earth; they are sweeping round upon the two hemispheres in contrary directions. The points of similar intensity are being disturbed along with the rest; and, from comparing the observations of Sir James Ross in the Atlantic with earlier observations in the same ocean, it would seem that the line of least intensity has been there moving northerly, during the last fifteen years, at the rate of rather more than thirteen miles annually.

In addition to the periodical and secular movements, the needle is subject to irregular perturbations, which—when of a sudden and violent nature, as they frequently are—have received the name of *magnetic storms*. Sometimes the perturbations are scarcely perceptible; but at others, the needle gradually moves without oscillation over several degrees to some fixed point, from which it will return in the course of a few minutes. On some rare occasions, the needle is capriciously agitated in a peculiar way. These disturbances are simultaneously propagated over vast regions; they have been synchronously observed over the whole surface of the globe, so that the needles in observatories thousands of miles apart are seen mysteriously to tremble at precisely the same moment.—The synchronism of the perturbations, however, is not confined to the larger and extraordinary changes, but even the minutest deviation at one place of observation has its counterpart of another.

Hypothesis of Terrestrial Magnetism.—One hypothesis regards the earth itself, as intrinsically magnetic in the sense that a loadstone is magnetic; but, in this hypothesis, it is difficult to account for the secular variations of the magnetic curves. Another hypothesis assumes that the seat of the earth's magnetism, if not entirely atmospheric, is at least so far superficial, as to be subject to external influence to a large amount, and the magnetic curves bearing no relation to any fixed lines in the globe, or to any determinate directions in external space. It is to be noticed, that Professor Barlow was able to imitate, on an artificial globe, most of the phenomena of the magnetic needle, by passing electro-magnetic currents round its surface.

Terrestrial magnetism, in its present state (says a Report of the Council of the Royal Society,) subdivides itself into two chief branches, which bear a certain analogy to the theories of the elliptic movements of the planets, and of their periodical and secular perturbations. The first comprehends the actual distribution of the magnetic influence over the globe at the present epoch, in its mean or average state, when the effects of temporary fluctuations are either neglected or eliminated, by extending the observations over a sufficient time to neutralize their efforts. The other comprises the history of all that is not permanent in the phenomena, whether it appear in the form of momentary, daily, monthly, or annual change and restoration, or in progressive changes, not compensated by counter changes, but going on continually accumulating in one direction, so as, in the course of many years, to alter the mean amount of the quantities observed. These last mentioned changes hold the same place in the analogy above alluded to with respect to the mean quantities and temporary fluctuations, that the secular variations in the planetary movements must be regarded as holding with respect to their mean orbits on the one hand, and their pertubations of brief period on the other. There is, however, this difference, that in the planetary theory, all these varieties of effect have been satisfactorily traced up to a single cause, whereas, in that of terrestrial magnetism, this is so far from being demonstrably the case, that the contrary is not destitute of considerable probability. In fact, the great features of the magnetic curves, and their general displacements and changes of form over the whole surface of the earth would seem to be the result of causes acting in the interior of the earth, and pervading its whole mass; while the annual and diurnal variations of the needle, with their train of subordinate periodical movements, may, and very probably do, arise from, and correspond to, electric currents produced by periodical variations of temperature at its surface, due to the sun's position above the horizon, or in the ecliptic modified by local causes; while local or temporary electric discharges, due to thermic, chemical, or mechanical causes, acting in the higher regions of the atmosphere, and relieving themselves irregularly or at intervals, may serve to render account of those unceasing, and, as they seem to us, casual movements, which recent observations have placed in so conspicuous and interesting a light. The electro-dynamic theory, which refers all magnetism to electric currents, is silent as to the cause of those currents, which may be various, and which only the analysis of their effects can teach us to regard as internal, superficial, or atmospheric.

Backwardness of the Cotton Crop.

We find in the Savannah Republican a table giving the date of bloom and frost, with the crop of each season, from 1836 to date.

Date of bloom.		Date of frost.	Extent of crop, bales.
1836	4th June	14th Oct.	1,432,000
1837	7th May	27th Oct.	1,800,000
1838	14th June	7th Oct.	1,360,000
1839	24th May	7th Nov.	2,117,000
1840	6th June	17th Oct.	1,630,000
1841	10th June	15th Oct.	1,683,000
1842	17th May	1st Nov.	2,379,000
1843	12th June	15th Oct.	2,030,000
1844	31st May	30th Oct.	2,394,000
1845	30th May	3d Nov.	2,100,000
1846	10th June	1st Nov.	1,800,000
1847	29th May	27th Nov.	2,348,000
1848	30th May	20th Nov.	2,700,000*
1849	15th June	10th Dec.	2,100,000

* 200,000 bales left over from preceding seasons.

A late bloom has been invariably followed by a short crop. The bloom of 1849 was one day later than any on record, and although the frost held off until December, giving the planters one of the finest picking seasons on record, yet the yield was reduced six or seven hundred thousand bales.

From present indications the bloom will scarcely make its appearance, in a majority of fields before the close of the month. The unprecedented lateness of the crop this season, with the continued drought, precludes all hope of a crop even approaching that of last year.

Steam Explosions and Evans' Safety Guard.

We extract the following from the report of the Commissioner of Patents. read in the Senate of the U.S. at its last session. It is in reply to a communication from the commissioners on the subject of steam boiler explosions; and the reply of Mr. Gray bears such strong testimony in favor of Evans' safety guard, that we would be wanting in duty to the public, and regardless of justice to our fellow townsman, not to publish it. We have all along believed that this invention would survive the storm of persecution with which it was at first assailed, and that justice, slow but sure, would be eventually extended to it by the great body of our engineers and practical men. The invention has been improved by Mr. Evans, in many material points. The fusible alloy, used in the "guards," *cannot harden* by use. It makes no difference how long in use, or how much exposed to heat, *it cannot lose its property of fusion*, and will not require a greater degree of temperature to melt it than at first designated. We learn that Mr. Evans has devoted the last three or four years to the attainment of important improvements, and that the guard now presented to the public challenges all objections.—We hope that such toil and perseverance, devoted to so noble an object, will meet with due reward, and that our engineers will cast aside all prejudices, and extend the hand of friendly regard to this beneficent improvement:

CUSTOM HOUSE OFFICE, St. Louis.

Sir—In answer to your interrogations, I respectfully answer in their order, &c.

* * * * * *

In the year 1841, I built a boat in Pittsburgh; the boilers had been used in another boat. At the earnest solicitation of Capt. May, of that city, I had placed on those boilers "Evans' safety valve," at the time, much against my own judgment. A year or so after, when running the boat, from the darkness of the night, it became necessary to lay up. On retiring to bed, I gave orders to the engineers to have steam up by daylight; the engineer, as I afterwards learned, passed the order to the watchman, and went to bed also.

The watchman, sometime before daylight, fired up, and raised steam before it was yet light. The old safety valve in due time commenced to blow off steam. The man in charge tied it down to prevent the noise, and not being capable of working the engine so as to supply the boilers with water, the steam increased rapidly, and Evan's valve went off and gave the alarm to myself and the engineer.—As soon as I ascertained the cause of the escapement of steam, I caused the fires to be cooled down, and the man head was taken out of the boiler to ascertain the fact if Evans' valve could be relied upon or not. On examining the water, after the

man head was taken out, I found the water had sunk in the boiler to a stage below what was safe, which was the cause of the explosion by Evans' valve, and I believe, had not the valve been upon the boilers, they would have blown up.

I have known other circumstances occurring on boats on which this valve was placed, *and I am firmly of opinion, that when Evans' valve is left free to act, no explosion can occur on boats.*

Very respectfully, &c.,
THOMAS GRAY,
Surveyor and inspector,

To COMMITTEE OF PATENTS,
Washington City.

We cannot understand why, for several years, this invention has been completely overlooked and allowed absolutely to go out of use when its value as a safeguard is altogether above doubt or question. Our own opinion has been fixed and firm in its favor, and we are confident that if the public attention can be directed to it, it will be brought into general use.

Railroad Economy.

We have given a hasty perusal to the new work of Dr. Lardner with the above title. In many respects it is an interesting rather than a useful work. It gives a minute account of the workings of European railroads, particularly those of England, the country in which these works have been pushed to a greater extent than in any other, and where at the same time the greatest losses have been sustained from their mismanagement. Tho' the general scope of the work is a history of railroads, and their influence upon the wealth and prosperity of a country, yet it contains much useful matter upon the management, which, tho' not new, cannot be too often repeated. The extraordinary depression of railroad property in England, is not, in our opinion, attributable so much to their mismanagement after they have gone into operation, as in their mismanagement prior to this, which so enormously adds to their cost, and from which we are entirely free in this country. The following extract which gives a pretty good idea of the character and style of the work is as well worthy the considerations of the companies here as in England. We shall recur to this work again in our next number.

Let us endeavor to convey to the unpractised reader some definite idea of this enormous speed of locomotion.

Seventy miles an hour is, in round numbers, 105 feet per second; that is to say, a motion in virtue of which the passenger is carried over 35 yards between two beats of a common clock. Two objects near him, a yard assunder, pass by his eye in the thirty-fifth part of a second; and, if 35 stakes were erected at the side of the road, a yard asunder, these 35 would pass his eye between two beats of a common clock, and it is scarcely necessary to say that they would not be distinguishable, the retina not being capable of receiving distinct successive impressions in so minute a fraction of time. If the stakes had any strong color, such as red, they would have the appearance of a continuous flash of red color. At such a speed, therefore, the objects on the side of the road are undistinguishable.

When two trains having this speed pass each other, the relative velocity will be double that, or 70 yards per second; and if one of the trains were 70 yards long, it would flash by in a single second.

It will be somewhat curious to investigate the movement of the mechanism of the engine, which produces this extraordinary speed.

Let us suppose that the driving wheels of the engine are about 7 feet in diameter, and, consequently, that they measure a little more than 21 feet, or 7 yards in circumference. These wheels would revolve five times in passing over 35 yards of the rails; and as this space is, on the supposition we have made, passed over in one second, these driving wheels must, necessarily, at such a speed, revolve five times per second. Now, to produce one revolution of the driving wheels, each piston must once pass backward and forward in the cylinder, and its motion, therefore, must divide a second into ten equal parts. On arriving at each end of the cylinder, at the moment it is about to change the direction of its motion, and to return, a valve must be shifted by which steam may be admitted on one side of the piston and withdrawn from the other side. This valve must therefore also be moved ten times per second, and must comple its motion so rapidly as to form but a small fraction of the entire stroke of the piston, and therefore its motion must be computed by a small fraction of the tenth part of a second, and this must be done with the utmost punctuality and uniformity, otherwise the action of the piston could not be continued. The cylinder discharges its contents through the escape valve every time that the piston changes its direction, and consequently this discharge must take place, under the circumstances here supposed, ten times per second.

But there are two cylinders, and the mechanism is so regulated that the discharge from the one is intermediate between two discharges from the other. There are therefore 20 discharges of steam per second, at equal intervals; and thus these 20 puffs divide a second into 20 equal parts, each puff having the twentieth of a second between it and that which precedes or follows it. The steam which thus puffs from the cylinders is conveyed by a pipe to the chimney, where it escapes upward in a succession of blasts, by which the draft through the fire place is maintained. It is these blasts of steam in the chimney which produce the coughing noise heard when a locomotive engine is moving slowly. As the rapidity augments, these coughs become more rapid, and when the speed attains the amount which we have supposed above, there will be 20 coughs per second. The ear, like the eye, is limited in the rapidity of the sensations of which it is susceptible, and active and sensitive as that organ is, it is not capable of distinguishing sounds which succeed each other at intervals of the twentieth part of a second; therefore, when the engine moves at such a rate, the puffing in the chimney ceases to be appreciated by the ear, although, as a mechanical effect, it continues to be produced as accurately and regularly as when the engine is moving slowly.

According to the experiments of Dr. Hutton, it appeared that the time of flight of a cannon ball, having a range of 6,700 feet, is one quarter of a minute.

The velocity was therefore 26,800 feet per minute, which is equal to five miles per minute, or 300 miles per hour.

It follows, therefore, that a railway train, moving at 75 miles an hour, not an uncommon speed for express trains to attain, would have a velocity only four times less than a cannon ball.

The momentum of such a mass, moving at such a speed, is difficult to conceive. It would amount to a force equivalent to the aggregate force of a number of cannon balls equal to one-fourth of its own weight.

The consideration of the great damage done to the railway, as well as to the rolling stock, by these extreme speeds, is a serious drawback to the gratification which such wondrous performances naturally excite. The fracture and wear of rails is augmented in a very high ratio with the speed; so likewise is the wear of all parts of the vehicles most affected, such as wheels, axles, &c.

I have shown that, at the speed we have here considered, a driving wheel, 7 feet in diameter, revolves 5 times per second; but the bearing wheels of carriages, wagons, and vans are in general only 3 feet in diameter, and sometimes even less. Now, if a wheel of 7 feet in diameter revolve 5 times per second, a wheel 3 feet in diameter, proceeding at the same speed, must revolve very nearly 12 times per second.

This, therefore, is the action which must take place upon all the wheels of the vehicles composing each express train.

The expense attending such extreme speed is not, however, limited to the cost which attends the trains themselves to which this motion is imparted. The whole traffic of the road is more or less affected by it. All other trains must be hurried forward to get out of the way of the express train, or detained in sidings to wait for its passage.

From these causes goods trains, which need not and ought not to move at a speed of more than 16 or 18, are frequently compelled to be driven at 30 miles an hour and upward. Their average speed is made up by undue speed when in motion, for the time lost waiting in sidings for the progress of express trains.

The damage done to the road by these causes is not merely that which arises from the undue speed which must occasionally be given to heavy goods trains; great damage is also done by the frequent stoppages of such trains. When they are stopped, their momentum must be spent upon the rails; and when they are put in motion afterward, and momentum imparted to them, the reaction produced by their driving wheels on the rails is another cause of most injurious wear and tear.

Railway directors and managers are deeply sensible of the great damage sustained by the property under their care in consequence of these circumstances, and frequent murmurs and remonstrances are heard upon the subject. The public, however, appear to be too exigent to be successfully resisted. I have no doubt, from long and careful practical investigations into the effects produced by the action of engines and carriages on railways, that the damage sustained directly and indirectly by railway proprietors in consequence of express trains moving at this extraordinary speed, is far greater than any profits derivable from such trains can cover: and I have no hesitation in saying, that, considered in a commercial point of view, railway proprietors would be fully justified, either in laying a much higher rate of fare upon express trains, or, which would be much more advisable and more consistent with their own interests, suppressing them altogether.

Missouri.

The Pacific Railway.

It has been heretofore announced that the surveys upon this work commenced from this city westwardly on the 24th of May. The party then sent out, we understand are progressing very well, and have found a very good route, much better than was anticipated, the maximum grade not exceeding 35 or 40 feet to the mile. This party are now running a line that shall be the cheapest and most direct to Jefferson city, and are now about 30 to 40 miles west of this city.

In order to start the surveys on the western division, commencing at Jefferson city and running westwardly to the western border, the President of the company, with the Chief Engineer and a party of assistants, embark to-day, we understand, for Jefferson city.

The people of Jefferson city and the corporate authorities of Cole county will now be called upon to show their patriotic spirit in affording encouragement and aid to this work. They may be assured that those who have charge of the affair are zealously in earnest, and intend to put the railroad through if means enough can be got. The corporate authorities of all the counties along the route will be called upon, and, by the charter of the road, all, through which the road may pass, are authorised to subscribe.—*St. Louis Intelligencer.*

South Carolina.

Greenville and Columbia Railroad—The Charleston Mercury says: "We are gratified to learn that the energetic President and his able Engineer are making rapid progress with this important work. The road is now finished and open for the accommodation of travellers for twenty three or twenty four miles above Columbia. The company have supplied themselves with engines and very handsome passenger cars, which leave Columbia daily, and we learn that on and after the 20th inst., accommodation coaches will be run regularly from the road to Newberry C. H., from which point to

Greenville C. H. the roads are at all times in good order. It is expected that in a few weeks the road will be completed to the bridge across the Broad river, from whence we understand Messrs. Douglass and Ward, the accommodating proprietors of the stages, propose to run a passenger coach thro' to Glenn Springs daily. We trust that the company will begin at once to realise the benefits of their enterprise, and that our citizens who propose leaving Charleston during the summer months, will take this course, leading to our own mountain region, than which no more delightful summer climate can be found anywhere."

AMERICAN RAILROAD JOURNAL.

Saturday, June 29, 1850.

Railroads in the West.

The rapid progress of the great leading lines of railroad from the Atlantic cities west, gives those links which are necessary to connect them with each other, or with the Mississippi, the immediate goal of all, an importance which they would by no means possess but for the relations they thus sustain. The great trunk lines from New York, Philadelphia and Baltimore are certain of being speedily constructed to the western line of Indiana. Illinois, now presents obstacles to the construction of roads upon routes demanded by the business of the country, but the obstacles we are confident will soon be removed, and her citizens allowed to build these works wherever it shall be for their interest to do so. The completion of the New York and Erie, the Pennsylvania Central and the Baltimore and Ohio railroad, will give an increased impulse to the lines which are to carry them forward to the Father of Waters, as they will find it for their interest to extend the necessary aid for their speedy construction.

The cities of Savannah and Charleston are soon to be united by railroad with Nashville, the capital of Tennessee. The Georgia roads have already reached Chattanooga, which is 432 miles from Savannah. The Nashville and Chattanooga railroad is in a state of forwardness, and will soon be opened. Nashville is 159 miles from Chattanooga.—From the former place to Hendersan, Kentucky, it is only 130 miles. Henderson is opposite Evansville, the Southern terminus of the great Indiana Canal, which is nearly completed, and is to extend from that place to Lake Erie by a line of 450 miles. From Evansville, a railroad is in progress in the direction of Indianapolis, where are to centre all the roads from the north, including Baltimore. All that will be wanting in a short time to connect the roads of the north and south, and those of the latter with the lake, will be the link between Nashville and the Ohio. This then becomes a conspicuous portion of this great interior line. Its construction is necessary to give symmetry to the whole.

A very favorable charter for this road has been granted by the States of Tennessee and Kentucky. The whole cost of the road has been estimated not to cost over $10,000 per mile. It traverses the most fertile and richest portions of these States, and we learn that those interested in the road as a local work, have abundant means to build it. There is certainly no part of the west where a railroad is more necessary. We hope to see the importance of this work appreciated by the people along its proposed line. There is no way in the world by which they can make money so fast as to build this road, and no way in which they can so surely elevate their social condition as by securing to themselves the means of cheap and rapid locomotion, which will give them both the means and the opportunity of visiting other parts of the country far and near, and of being visited in return.

Steam Communication Between the Great Lakes and the Mississippi.

It is well known that the Wisconsin and Fox rivers, in the State of Wisconsin, approach at one point within two miles of each other, the former falling into the Mississippi, and the latter into Lake Michigan. The land which separates these rivers at their nearest approach is so low as to be overflowed at high water, and the rivers are then united. The Wisconsin is navigable to this point without any improvement. The Fox river is obstructed by rapids which have thus far prevented its navigation by steam. These obstructions are but few in number, and easily surmounted. The State of Wisconsin, by aid of grants of land from the general government, has been for some time past engaged in removing the obstructions, and constructing locks and canals by the rapids, and steamboats will soon run from Lake Michigan to Lake Winnebago, a fine sheet of water about 30 miles long, and surrounded by one of the most beautiful countries in the world. By another season the whole work of improvement will be completed, and steamers will run from the Mississippi to the Lakes with full cargoes.

The above bids fair to become one of the most important public improvements ever made in the United States. The connecting the great Lakes and the Mississippi river by a route navigable by steamers must form an era, even in our present advanced state of internal communication. A boat may then load at Buffalo for the Falls of St. Anthony, the Yellow Stone, or New Orleans. The products of the great Mississippi valley will have a direct and cheap route to the Atlantic cities by way of the Lakes. Emigrants may then embark at Buffalo or Oswego, and be carried by the same steamer to the spot where they wish to settle. A new impulse will be given to the commerce of the country, and the bonds of our union made the stronger by the opening of this new route which is soon to rival all other artificial lines of water communication opened in this country.

East Tennessee and Georgia R. R.

This company has made such progress, that they are now in our market to purchase iron and the equipment for the first eighty miles, which will carry the road to the Tennessee river. To purchase the above articles the company have the bonds of the State of Tennessee for $350,000. The road will be in readiness for the iron as soon as it can be received.

Ohio.

Sundusky and Mansfield Railroad.—The work upon the extension of the Mansfield and Sandusky city railroad from Mansfield to Newark, is going on with rapidity. The company is now laying the iron at each end of the route at the rate of about half a mile per day. The road is to be completed to Belleville, 13 miles south of Mansfield, by the 4th of July, and by the 1st of September the company expect to meet the other division at Mt. Vernon, and celebrate the completion of the road to Newark in time for the fall trade.

New York.

Albany and Rutland Railroad.—The whole am't necessary to secure the construction of this road, with the exception of a hundred and fifty thousand dollars, has been raised.

From the Lake Superior Copper and Iron Region.

Minesota Mine.—The Lake Superior Journal of June 19th says this company's vessel, the Fur Trader, came in on Saturday last with 26 tons of native copper in masses, some of which weigh over 4,000 lbs. There are many other pieces out much heavier ready to be shipped down, and every day brings to light new masses of this kind. The prospects of this mining company are of the most encouraging character, bidding fair to soon rival the noted "Cliff" at Eagle river.

The same paper states that several tracts of land have lately been entered by persons about to engage in the manufacture of iron on a large scale. This is now carried on to quite an extent. The Journal says that the Jackson Iron Company at Carp river, shipped down by the Propeller Napoleon on her last trip about 40 tons of their iron, in blooms. This fine article of iron is to be taken to Pittsburgh for sale, and, in the very heart of Iron-dom, it will doubtless command the highest price. It has now been thoroughly tested by every manner of use, having been drawn into card-teeth wire with perfect satisfaction, manufactured into a good article of steel, and used with success wherever a fine article was necessary.

It was thoroughly tried, for heavy iron work, by Messrs. Ward, and was pronounced superior to the best article heretofore used. The Jackson Iron company are the pioneers in the manufacture of this iron, and they are now likely to receive a rich reward for their perseverance and investment.—Now that the expenses of manufacturing blooms and conducting the business has been ascertained, and its superiority over all other in the country has been established, they mean greatly to enlarge their works and extend their business. They intend putting on a large force of men, and erecting new furnaces the present season, and we doubt not, will make large shipments of blooms before the close of navigation.

This location embraces a large portion of the Iron Mountain and contains a sufficient quantity to supply the whole country for centuries. It is piled up in irregular stratified masses, easily split or broken up with a crow bar and sledge hammer;—and one may break and throw together fifty tons of this ore in one day. To make bar iron from this ore is a cheap and simple process, and the day is not far distant, when the markets around the whole chain of lakes will be supplied with their best iron from the Iron Mountain of Lake Superior.

Georgia.

Milledgeville and Gordon Railroad.—We learn that all the preliminary arrangements are now made for the completion of this road. At a recent meeting of the stockholders of this company, the directors were requested if practicable, to have the road in operation by the 1st of January next.

Indiana.

There is hardly a State in the Union doing more in railroads than Indiana. A few years only will elapse before every farmer will be within a convenient distance of one. Several of the roads have recently concluded purchases for their iron, or are now negotiating for this article—the Lafayette and Crawfordsville, and the Evansville and Mt. Carmel among others. A number of branch roads, and the Peru and Indianapolis we believe are laying a flat bar, which had either been used or purchased for other roads. A number of other compa-

nies will soon be in the market for their iron and equipment. Two years more will place this State in the rank of the leading railroad States of the Union.

New York.

Ogdensburgh Railroad.

We have received the last annual report of this company. As is well known, the road commences at Ogdensburgh, at the foot of navigation of the great lakes, and extends entirely across northern New York, terminating at Rouse's Point, on Lake Champlain. Its whole length is 117¼ miles. Forty-five miles are now open, and well supplied with engines and cars. The rails are now being laid from Ogdensburgh east, as rapidly as practicable, and another force will be employed in a few weeks in laying them on the middle division. It is expected that the entire track will be ready for use in the month of October next, and arrangements have been made to have it furnished with engines and cars sufficient to do all the business that may be offered at its opening.

The whole amount expended in construction, on the first day of May, including interest paid to the stockholders, and on loans, was	$2,032,000
The amount paid for engines and cars.	92,000
Making a total expenditure, at that time, of	2,124,000
The amount required to complete the work is	1,036,000
And for additional engines and cars to operate the whole road when opened.	168,000
Making the total cost of road, engines, cars, and fixtures, at its opening	$3,328,000

Which sum includes the interest already paid to bond and stockholders, and on loans, but does not include any interest to accrue hereafter.

The capital of the company is		$2,000,000
[The whole amount was subscribed for before its organization, and five per cent paid thereon. From various causes this subscription will be reduced nearly one quarter, the unpaid stock reverting to the company.]		
The amount, received by the company, from its stock subscriptions, to the 1st of May, was		$1,256,300
The amount of funded debt		599,000
The amount of floating debt		394,700
Total receipts		$2,250,000
The amount yet to be received from actual subscriptions for bonds, is	$310,000	
The amount that will be realized in cash from present stock subscriptions	40,000	
There will be payable to contractors in stock, under contracts now in force	227,000	
The company will have a balance of capital stock at its disposal of (at par)	476,700	–1,053,700
Balance		24,300
		$3,328,000

To which balance of	$24,300
Add the present floating debt	394,700
Making	$419,000

Which, when provided for by negotiation of the company's bonds, will leave the road finished, with a debt equal to the amount of stock reverted and belonging to the company.

The credit of the company is unimpared, notwithstanding the prevalent clamor against railroads, and but for the scarcity of money no difficulty would have been found in obtaining all their wants on the bonds which have been offered. In order to place these bonds in a more favorable light, the road, furniture, and fixtures have been mortgaged to secure their payment. This mortgage covers all bonds which have been or will be issued by the company to the extent of $1,500,000.

Rapid progress has been made dnring the last year in completing the various connecting lines of railway extending east and south from Lake Champlain. The Vermont and Canada will be finished the present season, and thus open communication with all New England, as well as those in the valley of the Hudson. The line of road connecting Rouse's Point with St. Johns, has been put under contract, and will be finished to meet the Ogdensburgh in October.

The directors believe that the bridge at Rouse's Point will be constructed at an early date, demanded as it is and will be by the great and varied interests of the trading and travelling community; but they do not consider it essential to the success of the Ogdensburgh road, for reasons which they give in brief.

The directors close their report by expressions of confidence in regard to the complete success of the road, but do not wish unduly to influence the present stockholders to retain their shares, or to purchase more than they now hold. They believe all the anticipations of its projectors will be realized, and that the road will yield a satisfactory income, when in full operation. The expenditures have been prudently and judiciously made, and the road, when finished, will be one of the cheapest and best constructed railways in America.

New York.

At a meeting of the stockholders of the Chemung railroad company, held at Jefferson, Chemung Co. on the 3d inst., an election was held for thirteen directors, when the following named gentlemen were duly elected:

Simeon Benjamin, Wm. Maxwell, John Arnot, Alexander S. Diven, Elmira; Charles Cook, Havana; Wm. W. Watson, Wm. N. Clark, Nathan Ridder, Charles A. Cook, Geneva; Isaac Otis, J. S. T. Stranghan, Freeman Rawdon, Josiah W. Baker, New York.

A meeting of the directors was held on the 20th instant, when the following gentlemen were duly elected officers for the ensuing year:

Simeon Benjamin, of Elmira, President. Isaac Otis, of New York, Treasurer. H. H. Casey, do., Secretary.

Railroad from Canandaigua to the Chemung R. Road.—We learn that this road, which is an extension of the Chemung railroad, is under contract for everything except the cars, at ten thousand dollars per mile, to experienced and faithful contractors. A considerable amount of stock has been subscribed, which, with the amount to be taken by the contractors, will be sufficient to get the road ready for the iron. It is believed that eight hundred thousand dollars will be ample to build and equip it completely. A saving of several hours will be made by running this road from Canandaigua to Jefferson over the Geneva Lake route, which will attract travel over the Chemung road. It is contemplated to extend the Canandaigua road to Batavia, and eventually to Lockport and the Niagara river.

Wisconsin.

Milwaukee and Mississippi Railroad.—The city of Milwaukee has loaned its credit to the above road to the amount of $250,000. This places in the hands of the company ample means to complete the first division of the road, 55 miles, to the Rock River Valley, which is to be done the present season.

Massachusetts.

Boston and Maine Railroad.—The fifteenth annual report of the directors of this road has been issued. It states that, "the usual July dividend has been delayed to the end of the year, by the action of the stockholders, in the protracted inquiry and severe scrutiny, which they caused to be instituted through their committee of investigation. The result of this examination into the condition of the company, proves the unquestionable soundness of the enterprise, and calls for renewed diligence on the part of the directors; and must give to the stockholders and the public the fullest confidence in the prosperity of the road." The following statement shows the business of the past year:

The reserved fund by the last annual report, amounted to	$48,272 45
Income for the year ending Nov. 30:	
From passengers	332,214 00
From freight	168,974 21
From mails, rents, and use of road	21,147 30
	$570,607 96
The expenditures properly chargeable to the operating of the road, and for depreciation of engines and cars	276,199 42
	$294,408 54
From which is to be deducted as extraordinary charges for this year, the items for loss of Salmon Falls bridge, car shop at Lawrence, committee of investigation and interest	53,491 19
	240,917 35
A dividend has been paid on 35,568 shares, of 5½ per cent.	195,624 00
Leaving as a present reserve	$45,293 35

Alabama.

Mobile and Ohio Railroad.—The work on the town end of this road continues to advance finely, and everything connected with the enterprise looks encouraging. A permanent bridge is being built by John King over Three Mile creek. When completed, which will be within a short time, temporary tracks will be laid down to facilitate the transportation of dirt for filling in the road through the swamp and the depot ground. By the close of this month the whole of the embankment, every foot of it being through the swamp and portions of it covered with water several feet deep, will be finished to the Three Mile creek, and a considerable portion of the depot filled in.

We are pleased to learn that the stockholders, as a general thing, pay up very promptly their instalments as they become due, thus enabling the directory to push the work with energy without running in debt.

The growing confidence in the value of this enterprise, and the ability to construct it, is not confined to our own people. Intelligent men in all sections of the Union consider it by far the most important railroad yet commenced in the United

States. The length of it, to be sure, renders it a heavy undertaking. But in view of the large and diversified extent of country to be benefitted by it—the vast agricultural and manufacturing resources to be developed—the immense travel that will pass over it, and, as a consequence, the handsome profits that must certainly accrue to the stockholders—even its great length of line dwindles comparatively into insignificance.—*Alabama Planter.*

Notice to Contractors.

HUDSON RIVER RAILROAD.—Proposals for contracts for grading that part of the Hudson River Railroad not now under contract, will be received by the Directors of the Company, at the office, 54 Wall street, New York, until the 2d day of July, at noon, which will be answered on the Saturday following (July 6th.)

The work consists principally of rock and earth excavations, to be carried into embankments, for the road bed on Sections No. 67 to 74 inclusive, extending from Garretson's Point two miles above Rhinebeck to East Camp, about 13 miles. In regard to examinations for proposals, reference to be made to Wm. Jervis, Resident Engineer, at Tivoli, Dutchess county.

Also sections 75 to 83, inclusive, about fourteen miles. In regard to which, refer to John C. Campbell, Resident Engineer, at Hudson.

Payments will be made in cash on monthly estimates, reserving 15 per cent. until the work is completed.

The part of the work above Oak Hill, which is opposite Catskill, will be required to be finished on or before the 1st March, 1851, and that below on or before the 1st of July following.

Contractors whose bids may be accepted will be required to enter into contract and commence the work without delay.

The names in full of all parties proposing to be interested in contracts must be given in the proposition, as no assignment or transfer of bids will be permitted.

The Directors reserve to themselves the right to accept or reject proposals that may be offered, as they may consider the interest of the company to require. WILLIAM C. YOUNG,
Chief Engineer.

Dated June 19, 1850.

Patent Self-clinching Railroad Spikes.

These spikes have been in use upon various roads for several years, and have met with universal approval by Engineers. They drive in the manner shown, turning themselves, and are therefore not liable to work loose. They will prove of great value to secure the chair.

We are also manufacturing railroad spikes, hook and flat head; wrought chairs, clamps, etc., of superior quality, and are prepared to contract for any pattern or weight upon favorable terms.

SMITH & TYSON,
25 South Charles st., Baltimore Md.

NORRIS' LOCOMOTIVE WORKS, SCHENECTADY, N. Y.

THESE Works are in full operation in Manufacturing to order, Locomotive Steam Engines & Tenders, of the best principle and construction of material, using wrought iron heavy frames with pedestals welded thereto, and all parts of the engine made of the best wrought iron, except cylinders, pumps and boxes—obtaining greater durability, and carrying less weight over the road, than engines constructed of cast iron.

Wrought Iron Tires made any required size, and Tire Bars bent and welded with dispatch.

Chilled Wheels for Cars, Tucks and Tenders, made from the toughest iron.

Driving and Tender and Car Wheels fitted to Axles with Brass Boxes and Springs, and Railroad Machinery generally. Manufactured and for sale by

April 11, 1849. E. S. NORRIS.

Ray's Patent India Rubber Car Springs.

Savannah, Ga., May 22, 1850.

Fowler M. Ray, Esq.,

Dear Sir: I have no hesitation in saying, after having used on our road your springs and Fuller's, that I consider yours decidedly the best in every particular, and in this opinion I am sustained by all our officers. Fuller's spring has a tendency to split, and also to chafe or abrade by the constant friction on the cast iron plates or disc: and in my opinion is not near so elastic as yours.

Your springs, which have been in use on our road for 12 or 15 months past, and in constant use under both passenger and freight cars, are to all appearances as elastic, sound and good, as when first put in use.

We are now building eigty-five new cars, of which for fifty-sets the springs have been ordered of you.

GEORGE A. ADAMS,
Master Carpenter,
Central Railroad and Banking Co. of Georgia.

—

Connecticut River Railroad Office, }
Northampton, May 4, 1850. }

E. Crane, Esq.,

Dear Sir: It is now about two years since I first tried the experiment of using a set of Ray's India-rubber Springs upon one of our merchandise cars, and although the car has been in constant service since that time, I do not on examination find the slightest difference either in the thickness or elasticity of the material.

The same result has followed wherever we have applied them, either for wheel or draw springs on Engines, Tenders or Cars. At present we use no other; either in replacing old springs or building new cars—and I am perfectly satisfied that for economy, durability, safety, and ease of motion, that Ray's India-rubber is the best article for Springs which has been presented to the public.

Yours respectfully, J. HUNT,
Supt. Connecticut River Railroad.

—

Edward Crane, Esq.,

Dear Sir: Having applied to cars of the Boston and Worcester Railroad Corporation, Ray's Vulcanised Rubber Springs (where they have been in use for some two years last past), I have had occasion to observe their operation, and am free to say in answer to your inquiries, that they retain their *elasticity* perfectly during all changes of atmospheric temperature: and are in my opinion a most valuable acquisition to Railroad Cars—are not liable to derangement, as is the case with steel springs; while at the same time it costs less to apply them. Respectfully yours,

D. N. PICKERING,
Supt. Motive Power, Bost. & Wor. Railroad.

Boston, April 15th, 1850.

NORTHERN RAILROAD,
NEW YORK.

CARS run between Rouses Point and Chateaugay daily, Sundays excepted, as follows:

Leave Rouses Point at . . $3\frac{3}{4}$ A.M.
Leave Chateaugay at . . $6\frac{1}{4}$ P.M.

On the arrival of the cars at Chataugay, stages are in readiness to take the passengers to Ogdensburg, where they arrive the same day.

Passengers leave Ogdensburg in the morning by stage, and take the evening train from Chatauqay to Rouses Point, where they go immediately on board the steamboats which run north and south on Lake Champlain.

Passengers leaving New York in the evening by the way of Whitehall, will arrive at Rouses Point the next night, and the next morning pass directly from the boat to the cars, and arrive at Ogdensburg the same day. CHARLES L. SCHLATTER, Supt.

Ibbotson, Brothers & Co's CELEBRATED CAST STEEL AND

Best Cast Steel Royal Improved Files, well known as better adapted for Engineers' and Machinists' purposes than any now in use in the United States.

Every description of Square, Octagon, Flat and Round Cast Steel, Sheet, Shovel and Railway Spring Steel, etc., and Steel to order for any purposes—manufactured at their works in Sheffield—and universally known by the old stamp "Globe."

HENRY J. IBBOTSON, Agent.,
218 Pearl st., New York.

NOTICE.

A young man of experience in Surveying wishes a situation on a Railroad as an Assistant. Please apply at this office.

Election of an Engineer.

At a Meeting of the Board of Directors of the Virginia Central Railroad Co. at Charlotteville on the 4th day of June, 1850,

Resolved, That the election of a Chief Engineer in the place of Wm. A. Kuper, whose resignation has been accepted, is postponed to take place in Richmond on Tuesday the 18th of June instant.

A copy from the minutes.
JOHN GARRET, Secretary.

Lovegrove's Patent Cast Iron Water and Gas Pipes.

THE Subscriber, the Inventor and Patentee of the Centrifugal mode of giving form to metallic substances while in a molten state, is preparing to make Cast Iron Water and Gas Pipes, of any dimensions, at prices much lower than they can be made in the old manner, and the pipes warranted to stand a pressure of three hundred pounds to the square inch, and to be soft enough to drill. Steam Engines and all kinds of machinery. Cast Iron Doors and Frames, and Mill Castings of every description, made to order.

THOMAS LOVEGROVE,
Machinist and Founder,
West Falls Avenue, below Pratt st., Baltimore.

American Railway Guide, AND POCKET COMPANION FOR THE UNITED STATES;

CONTAINING Correct Tables, showing the time for starting of trains from all stations, distances, fares, etc., on all the Railway lines in the U. States; also many of the principal Steamboat and Stage routes—accompanied by a complete Railway Map. Price, single copies $12\frac{1}{2}$ cts., or $1 per annum. Published on the first of every month, corrected from returns furnished by the Railway Superintendents throughout the Union.

This book has been compiled somewhat on the plan of Bradshaw's Guide, with such improvements in size, form and arrangement as have seemed desirable; and the publisher confidently hopes it will not be found liable to the objections of incompleteness and incorrectness, which have been made, and justly too, against various other similar works heretofore issued.

The subscriber having had the management of the NEW YORK PATHFINDER almost from its commencement, has enjoyed superior facilities in obtaining information relating to the thoroughfares of travel, and is therefore well qualified to prosecute with success the arduous undertaking of furnishing a complete and correct national guide book.

STRINGER & TOWNSEND, General Agents, 222 Broadway: and sold also by Booksellers and Periodical Dealers generally throughout the country; also on all the Railways and Steamboats.

CURRAN DINSMORE, Publisher.
N. Y. Pathfinder Office, }
138 Fulton St., New York City. }

India-rubber for Railroad Cos.

RUBBER SPRINGS—*Bearing and Buffer—Fuller's Patent—Hose* from 1 to 12 inches diameter. Suction Hose. *Steam Packing*—from 1-16 to 2 in. thick. *Rubber and Gutta Percha Bands.* These articles are all warranted to give satisfaction, made under Tyer & Helm's patent, issued January, 1849.—No lead used in the composition. Will stand much higher heat than that called "Goodyear's," and is in all respects better than any in use. Proprietors of railroads do not be overcharged by pretenders.

HORACE H. DAY,
Warehouse 23 Courtlandt street.

New York, May 21, 1849.

To Railroad Companies.

FOR SALE—A Second-hand Locomotive Engine and Tender, of about 10 tons weight, in good order, and *warranted to perform well.* Any company wanting a cheap engine for a passenger or light burden train, will rarely meet with an opportunity so favorable as the present. The engine and tender are in perfect running order, and will be tested to the satisfaction of any one wishing to purchase. Price $1,500.

Address J. B. MOORHEAD,
Frazer P.O., Chester county, Pa.

P.S.—The Engine can be seen by calling on H. Osmond & Co., Car-builders, Broad st., Philadelphia.

September 6, 1849.

Spikes, Spikes, Spikes.

ANY person wishing a simple and effective Spike Machine, or a number of them, may be supplied by addressing J. W. FLACK,

March 6, 1850. Troy, N. Y.

Great American Engineering

AND MECHANICAL WORK, just published in medium folio, 75 cts. to Subscribers, One Dollar to non-subscribers.

Part VI of "Specimens of the Stone, Iron and Timber Bridges, Viaducts, Tunnels, &c. &c. of the United States Railroads." By George Duggan, Architect and Civil Engineer.

The present part contains beautifully executed plans, elevations and sections of the Timber Bridge (three spans of 150, and one span of 160 feet) across the Delaware at Saw Mill Rift, on the line of the N. York & Erie R. R., with the specifications, estimates, bills of timber, iron, etc.

N.B.—With the present (6th) part, are given specimen Plates of the APPENDIX, (or "THEORETICAL AND PRACTICAL TREATISE ON BRIDGE BUILDING, etc. etc.") consisting of plans, elevations, sections and details of a cast iron oblique arch, 130 feet span, across Fairfield st. Manchester, on the line of the Manchester and Birmingham Railroad. Also a specimen sheet of the letter press of the APPENDIX, consisting of an introductory article on the *Application of Iron to Railroad Structures.*

"It is a work that was a great desideratum, and must prove of great benefit to the engineering profession generally, and especially to the tyro in practical engineering and mechanical knowledge; in truth it strikes us, that it would require years of labor and patient toil on the part of a young engineer to prepare the drawings, and collect the information that will be embodied in this work, and can now be secured for the trifling sum of $9"—[Scientific Amer. March 16, 1850.

In connection with this subject (Iron Railroad Structures) we take occasion to call attention again to Mr. Duggan's valuable and expensive publication, exhibiting drawings, with full descriptions of the various stone, iron and wooden bridges, viaducts, tunnels, culverts, etc., of all the Railroads in the United States. Mr. Duggan is an accomplished Architect and Civil Engineer, who came from Ireland to this country to exercise his profession; but finding Railroad construction here, in many respects, different from that he had been accustomed to in Europe, he applied himself to the study of our system; and the fruits of his researches and investigations embodied in this work, are well calculated to meet the exigencies of engineers, and to assist draughtsmen, bridge builders, mechanics and students.—[N. Y. Journal of Commerce, Feb. 14, 1850.

Published by GEORGE DUGGAN,
300 Broadway, New York.

To whom all communications should be addressed, and subscriptions forwarded.

RAILROAD CAR AND COACH TRIMMINGS.

Doremus & Nixon,

IMPORTERS AND FURNISHERS

HAVE FOR SALE

Plain Garnet Plush.	Fig. Garnet Plush (Butterfly pat.
" Crimson "	" Crimson " (Elegant.
" Scarlet "	" " " (Gen. Taylor.

BROCATELLES.

Crimson Silk Brocatelles.	Gold and Maroon do.
Gold and Blue "	" Brown "
Silk and Wool "	of every color.

MOQUETTS,

Of elegant designs and colors.

GERMAN CLOTH FOR CAR LININGS.

The most beautiful goods ever shown in this country, and the subscribers are the sole agents for the sale of them.

Oil cloths Enamelled with Gold.	These goods can be
" " Silver.	furnished in any
Do. Silver ground velvet printed.	dimensions req'd.

CURLED HAIR

Of every description and quality.

JNO. W. A. STRICKLAND, Agent.
New York, 1850. 1y16

Stickney & Beatty,

DEALERS IN IRON AND IRON MANUFACTURERS.

AGENTS for the Balt. City Rolling Mill, from which establishment they are prepared to furnish Ellicott's round, square, and flat bar iron, puddled and charcoal boiler plates and billet iron—also agents for the sale of the Laurel and Maryland (Balt.) charcoal forge pig irons, Balt. hard iron for chilling wheels, anti-Eatam nails, Catoctin foundry iron, boiler blooms from the Caledonian works, Wm. Jessop & Son's cast steel, Coleman's blister steel and nail rods, hoop, band, sheet, oval and common English iron.

Nos. 18 and 20 South Charles st., Baltimore.

Fire Brick.

THE Subscribers have constantly on hand Rafford's Stourbridge, Oak Farms Stourbridge, Lister, Wortley, Red and White Welsh Fire Bricks, common and fancy shapes. Also,

ROOFING SLATES,

from the best Welch quarries, and of all sizes. Also,

COAL,

of all kinds—Liverpool Orrell and Cannel, Scotch, New Castle, Pictou, Sidney, Cumberland, Virginia, and all kinds of Anthracite coals. Also,

Pig Iron, Salt, etc., etc., for sale at the lowest market price. Apply to

SAMUEL THOMPSON & NEPHEW,
275 Pearl and 43 Gold Sts., New York.

November, 23, 1849.

FAIRBANKS' RAILROAD SCALES.—THE subscribers are prepared to construct at short notice, *Railroad* and *Depot Scales*, of any desired length and capacity. Their long experience as manufacturers—their improvements in the construction of the various modifications, having reference to strength, durability, retention of adjustment, accuracy of weight and dispatch in weighing—and the long and severe tests to which their scales have been subjected—combine to ensure for these scales the universal confidence of the public.

No other scales are so extensively used upon railroads, either in the United States or Great Britain;—and the managers refer with confidence to the following in the United States.

Eastern Railroad.	Boston & Maine Railroad.
Providence Railroad.	Providence and Wor. Road.
Western Railroad.	Concord Railroad.
Old Colony Railroad.	Fitchburg Railroad.
Schenectady Railroad.	Syracuse and Utica Road.
Balt. and Ohio Railroad.	Baltimore and Susq. Road.
Phila. & Reading Road.	Schuylkill Valley Road.
Central (Ga.) Railroad.	Macon and Western Road.

New York and Erie Railroad.

And other principal Railroads in the Western, Middle and Southern States.

E. & T. FAIRBANKS & CO.
St. Johnsbury, Vt.

Agents, FAIRBANKS & Co., 89 Water St., N. York.
A. B. NORRIS, 196 Market St. Philadelphia.

April 22, 1849. 1y*17

STABILITY—SECURITY—PERPETUITY.

Mutual Life Insurance Co. of New York.

No. 35 WALL STREET.

A MILLION OF DOLLARS

Securely invested in Bonds and Mortgages on real estate in this city and Brooklyn, and stocks of the State and City of New York and United States Government.

The company declared a dividend of profits of fifty-two per cent. on all existing policies on the 31st of January, 1848.

All the Profits are Divided Among the Insured.

Persons may effect insurance on their own lives and the lives of others.

A married woman can insure the life of her husband, the benefits of which are secured by law for the exclusive use of herself or children.

Clergymen and all others dependent upon salaries or their daily earnings are specially invited to avail themselves of a resource whereby their surviving families may be secured from the evils of penury.

Pamphlets explanatory of the principles of Mutual Life Insurance, and illustrating its advantages, with forms of application, may be obtained at the office of the company, 35 Wall street, or of any of its agents.

TRUSTEES.

Jos. B. Collins,	Abraham Bininger,
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C. W. Faber,	Isaac G. Pearson,
John P. Yelverton,	Henry Wells,
Theo. Sedgwick,	Wm. Moore,
Stacy B. Collins,	George R. Clark,
John H. Swift,	Jona. Miller,
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S. M. Cornell,	Robert Schuyler,
Gouv. M. Wilkins,	James Chambers,
John V. L. Pruyn,	Joseph Tuckerman,
Jas. S. Wadsworth,	Moses H. Grinnell,
Charles Ely,	Wm. J. Banker,
John C. Cruger,	John M. Stuart,
Charles King,	Francis S. Lathrop,
Alfred Pell,	Nathaniel Hayden.

JOSEPH. B. COLLINS, President.
ISAAC ABBATT, Secretary. 3m9

NOTICE TO

Superintendents of Railroads.

TYLER'S PATENT SAFETY SWITCH.—The undersigned would respectfully call their attention to his Patent Safety Switch, which from long trial and late severe tests has proved itself perfectly reliable for the purpose for which it was intended. It is designed to prevent the train from running off when the switch is set to the wrong track by design or accident. The single rail or gate switch is established as the best and safest switch for the ordinary purpose of shifting cars from one track to another, but it is liable to the serious evil of having one track open or broken when connected with the other. My improvement entirely removes this evil, and while it accomplishes this important office, leaves the switch in its original simplicity and perfection of a plain unbroken rail, connecting one track with the other ready for use.

The following decision of the Commissioner of Patents is respectfully submitted to Railroad Engineers, Superintendents, and all others interested in the subject. P. B. TYLER.

(COPY.)

UNITED STATES PATENT OFFICE,
Washington City, D.C., April 28th, 1846.

SIR: You are hereby informed that in the case of the interference between your claims and those of Gustavus A. Nicolls, for improvements in safety switches—upon which a hearing was appointed to take plrce on the 3d Monday in March, 1846, the question of priority of invention has been decided in your favor. Inclosed is a copy of the decision. The testimony in the case is now open to the inspection of those concerned.

Yours respectfully, EDMUND BURKE,
Commissioner of Patents.

To Philos B. Tyler.

Any further information may be obtained by addressing P. B. TYLER, Springfield, Mass., or JOHN PENDLETON, Agent, 149 Hudson St., New York.

Coal.

CUMBERLAND SEMI-BITUMINOUS COAL superior quality for Locomotives, for sale by

H. B. TEBBETTS,
No. 40 Wall St., New York.

May 12, 1849. 1m19

PHILADELPHIA CAR MANUFACTORY,

CORNER SCHUYLKILL 2D AND HAMILTON STS.,
SPRING GARDEN, PHILADELPHIA CO., PA.

Kimball & Gorton,

Having recently constructed the above works, are prepared to construct at short notice all kinds of

RAILROAD CARS, Viz:

Passenger Cars of all classes—Open and Covered Freight and Express Cars—Coal Cars—Hand Cars & Trucks of all descriptions.

They are also prepared to furnish Chilled Wheels of any pattern. Car Wheels & Axles fitted and furnished. Snow Ploughs and Tenders made to order. Steel and other Springs always on hand.

All orders will be filled at short notice, and upon as good terms as at any other establishment in the country.

Omnibuses from the Exchange run within one square of the manufactory every 10 minutes during the day.

Philadelphia, June 16, 1849. 1y25

C. W. Bentley & Co,

IRON Founders, Portable Steam Engine Builders and Boiler Makers, Corner Front and Plowman Sts., near Baltimore St. Bridge,

BALTIMORE, MARYLAND.

Their Engines are simple in their construction, compact and durable; they require no brick work in setting them, and occupying but a small space (a six horse power engine and boiler, standing on a cast iron plate of three by six feet.)

They also manufacture Major W. P. Williamson's new oscillating Engine; a superior article, combining cheapness and simplicity (one of which may be seen in operation at their shop.) Both of these engines are adapted to any purpose, where power is required, and may be made of any capacity; and for economy in use of fuel are unsurpassed.

All kinds of machinery made to order. Steam Generators, Force Pumps, Wrought Iron Pipes and Fillings for Steam, Water, Gas, etc., constantly on hand,

Baltimore, June 6, 1849.

CORROSIVE SUBLIMATE.

THIS article now extensively used for the preservation of timber, is manufactured and for sale by POWERS & WEIGHTMAN, manufacturing Chemists, Philadelphia.

Jan. 20, 1849.

Railroad Car Manufacturer's Furnishing Store.

F. S. & S. A. MARTINE,
IMPORTERS AND MANUFACTURERS OF
RAIL ROAD CAR & CARRIAGE LININGS,
PLUSHES, CURTAIN MATERIALS, ETC.,
112 WILLIAM ST., NEAR JOHN.
3-4 and 6-4 Damasks, Union and Worsted; Moreens, Rattinetts, Cloths, Silk and Cotton Velvets, English Buntings

To Engineers and Surveyors.

E. BROWN AND SON Mathematical inst. makers No. 27 Fulton Slip, New York, make and keep for sale, Theodolites, Levelling inst., Levelling rods, Surveyors Compasses, and Chains, Cases of Mathematical drawing insts. various qualities, together with a general assortment of Ivory Scales and small insts. generally used by Engineers.

Samuel Kimber & Co.,

COMMISSION MERCHANTS
WILLOW ST. WHARVES, PHILADELPHIA.

AGENTS for the sale of Charcoal and Anthracite Pig Iron, Hammered Railroad Car and Locomotive Axles, Force Pumps of the most approved construction for Railroad Water Stations and Hydraulic Rams, etc., etc.
July, 27, 1849.

James Herron, *Civil Engineer*,

OF THE UNITED STATES NAVY YARD,
PENSACOLA, FLORIDA.,
PATENTEE OF THE
HERRON RAILWAY TRACK.
Models of this Track, on the most improved plans, may be seen at the Engineer's office of the New York and Erie Railroad.

To Railroad Companies.

—WROUGHT IRON WHEELS—
SAFETY AND ECONOMY.
NORRIS' LOCOMOTIVE WORKS,
SCHENECTADY, NEW YORK,
Are Manufacturing Wrought Iron Driving, Truck, Tender, and Car Wheels—made from the best American Iron. Address E. S. NORRIS.
May 16, 1849.

Machinery Warehouse.

S. C. HILLS, No. 43 Fulton street, New York, has constantly for sale Steam Engines, Boilers, Lathes, Chucks, Drills, Planers, Force and Suction Pumps; Tenoning, Morticing and Boring Machines, Shingle Machines, Bolt and Nut Machines, Belting, Oil, Iron and Lead Pipe; Rubber, Percha and Leather Hose, &c., &c.

S. C. H.'s arrangements with several machine shops are such that he can supply, at very short notice, large quantities of machinery.
November 23, 1849.

George O. Robertson,

BROKER IN SCOTCH AND AMERICAN PIG IRON;
Bar Iron, Lead, Spelter, Tin, Copper, etc.,
No. 4 Liberty Place, MAIDEN LANE,
(Near Broadway,)
NEW YORK

Manufacture of Patent Wire ROPE AND CABLES,

For Inclined Planes, Suspension Bridges, Standing Rigging, Mines, Cranes, Derrick, Tillers, &c., by
JOHN A. ROEBLING, Civil Engineer,
TRENTON, N. J.

Samuel D. Willmott,

MERCHANT, AND MANUFACTURER OF
CAST STEEL WARRANTED SAWS,
—AND FILES—
IMPORTER OF THE
GENUINE WICKESRLY GRINDSTONES
NO. 8 LIBERTY STREET,
NEW YORK.

Doremus & Harris,

ANALYTICAL & CONSULTING CHEMISTS,
179 BROADWAY, NEW YORK.
☞SCHOOL OF CHEMISTRY.☜

IRON.

Railroad Iron.

3,000 TONS C. L. MAKE 63½ lbs. per yard, now landing and to arrive.
Also contracts made for future delivery of above superior make English Iron.
300 Tons Banks Best Iron, Round, Square and Flat.
200 " English Bar " " "
10 " 9-16 Square Iron for Railroad Spikes.
For sale in lots to suit purchasers by
DAVID W. WETMORE.
New York, March 26, 1850. 3m

SPRING STEEL FOR LOCOMOTIVES, TENDERS AND CARS.—The subscriber is engaged in manufacturing spring steel from 1¼ to 6 inches in width, and of any thickness required: large quantities are yearly furnished for railroad purposes, and wherever used its quality has been approved of. The establishment being large, can execute orders with great promptitude, at reasonable prices, and the quality warranted. Address J. F. WINSLOW, *Agent*,
Albany Iron and Nail Works.

Railroad Iron.

THE Undersigned, Agents for Manufacturers, are prepared to contract to deliver Rails of superior quality, and of any size or pattern, to any ports of discharge in the United States.
COLLINS, VOSE & CO.,
74 South St.
New York, June 1, 1850.

Railroad Iron.

1,500 Tons weighing 58 lbs. per lineal yard.
500 " " 57 " "
500 " " 56 " "
500 " " 60 & 61 lbs, "
Also 2½x½ flat rails. All the above being of approved patterns. For sale by
DAVIS, BROOKS, & CO.,
68 Broad street.
N.B.—Rails imported on commission, or at a fixed price.

Iron.

Pig Iron, Anthracite and Charcoal; Boiler and Flue Iron, Spring and Blistered Steel, Nail Rods, Best Refined Bar Iron, Railroad Iron, Car Axles, Nails, Stove Castings, Cast Iron Pipes of all sizes, Railway Chairs of approved patterns' for sale by
COLEMAN, KELTON & CAMBELL,
109 N. Water St., Philadelphia.

IRONDALE PIG METAL, MANUFACTURED and for sale by the Bloomsburg Railroad Iron Co.
LINDLEY FISHER, Treasurer.
75 N. Water St., Philadelphia.

Railroad Iron.

2000 Tons, weighing 58 pounds per lineal yard, of the most approved pattern of T rails, in store and to arrive, for sale by
COLLINS, VOSE & CO.,
74 South St.
New York, June 1, 1850.

Railroad Iron.

1675 Tons, weighing about 61 lbs. per yard, 90 tons, weighing about 52 lbs. per yard, and 825 tons, weighing about 53½ lbs. per yard, of the latest and most approved patterns of T rail, for sale by
BOORMAN, JOHNSTON & CO.,
119 Greenwich street.
New York, Feb. 25, 1850.
N.B.—B., J. & Co are also prepared to take contracts for English rails, delivered in any of the Atlantic ports of the Unitad States.

Railroad Iron.

THE UNDERSIGNED, HAVING made arrangements abroad, are prepared to contract for the delivery of Foreign rails, of approved brands upon the most favorable terms.

They will also make contracts for American rails, made at their Trenton works, from Andover Iron, in whole or in part, as may be agreed upon.

They are prepared to furnish Telegraph, Spring and Market Wire; Braziers and Wire Rods; Rivets and Merchant Bars to order, all made exclusively from Andover Iron. The attention of parties who require iron of the *very best* quality for special purposes, is respectfully invited.
COOPER & HEWITT,
17 Burling Slip, New York.
February 15, 1850.

Glendon Refined Iron.

Round Iron, Band Iron, Hoop Iron,
Square " Flat " Scroll "
Axles, Locomotive Tyres,
Manufactured at the Glendon Mills, East Boston, for sale by GEORGE GARDNER & CO.,
5 Liberty Square, Boston, Mass.
Sept. 15, 1849. 3m37

PATENT HAMMERED RAILROAD, SHIP & BOAT SPIKES.—The Albany Iron Works have always on hand, of their own manufacture, a large assortment of Railroad, Ship and Boat Spikes from 2 to 12 inches in length, and of any form of head. From the excellence of the material always used in their manufacture, and their very general use for railroads and other purposes in this country, the manufacturers have no hesitation in warranting them fully equal to the best spikes in market, both as to quality and appearance. All orders addressed to the subscribers at the works will be promptly executed.
JOHN F. WINSLOW, *Agent*.
Albany Iron and Nail Works, Troy, N. Y.
The above Spikes may be had at factory prices, of Erastus Corning & Co Albany; Merritt & Co., New York; E. Pratt & Brother, Baltimore, Md

LAP—WELDED WROUGHT IRON TUBES FOR TUBULAR BOILERS,

FROM ONE AND A QUARTER TO SEVEN INCHES IN DIAMETER.

THE ONLY Tubes of the same quality and manufacture as those so extensively used in England, Scotland, France and Germany, for Locomotive, Marine and other Steam Engine Boilers.
THOMAS PROSSER & SON, Patentees,
28 Platt street, New York.

Railroad Iron.

THE UNDERSIGNED ARE PREPARED TO contract for the delivery of English Railroad Iron of favorite brands, during the Spring. They also receive orders for the importation of Pig, Bar, Sheet, etc. Iron. THOMAS B. SANDS & CO.,
22 South William street,
February 3, 1849. New York.

Iron Store.

THE Subscribers, having the selling agency of the following named Rolling Mills, viz: Norristown, Rough and Ready, Kensington, Triadelphia, Pottsgrove and Thorndale, can supply Railroad Companies, Merchants and others, at the wholesale mill prices for bars of all sizes, sheets cut to order as large as 58 in. diameter; Railroad Iron, domestic and foreign; Locomotive tire welded to given size; Chairs and Spikes; Iron for shafting, locomotive and general machinery purposes; Cast, Shear, Blister and Spring Steel; Boiler rivets; Copper; Pig iron, etc., etc.
MORRIS, JONES & CO.,
Iron Merchants,
Schuylkill 7th and Market Sts., Philadelphia.
August 16, 1849. 1y33

Railroad Iron.

THE MOUNT SAVAGE IRON WORKS, ALleghany county, Maryland, having recently passed into the hands of new proprietors, are now prepared, with increased facilities, to execute orders for any of the various patterns of Railroad Iron. Communications addressed to either of the subscribers will have prompt attention. J. F. WINSLOW, *President*
Troy, N.Y.
ERASTUS CORNING, Albany.
WARREN DELANO, Jr., N.Y.
JOHN M. FORBES, Boston.
ENOCH PRATT, Baltimore, Md.
November 6, 1848.

Railroad Iron.

THE SUBSCRIBERS ARE PREPARED TO take orders for Railroad Iron to be made at their Phœnix Iron Works, situated on the Schuylkill River, near this city, and at their Safe Harbor Iron Works, situated in Lancaster County, on the Susquehannah river; which two establishments are now turning out upwards of 1800 tons of finished rails per month.

Companies desirous of contracting will be promptly supplied with rails of any required pattern, and of the very best quality.
REEVES, BUCK & CO.
45 North Water St. Philadelphia.
March 15, 1849.

Monument Foundry.

A. & W. DENMEAD & SON,

Corner of North and Monument Sts.,—Baltimore,

HAVING THEIR

IRON FOUNDRY AND MACHINE SHOP

In complete operation, are prepared to execute faithfully and promptly, orders for
Locomotive or Stationary Steam Engines,
Woolen, Cotton, Flour, Rice, Sugar Grist, or Saw Mills,
Slide, Hand or Chuck Lathes,
Machinery for cutting all kinds of Gearing.
Hydraulic, Tobacco and other Presses,
Car and Locomotive patent Ring Wheels, warranted,
Bridge and Mill Castings of every description,
Gas and Water Pipes of all sizes, warranted,
Railroad Wheels with best faggotted axle, furnished and fitted up for use, complete

☞Being provided with Heavy Lathes for Boring and Turning Screws, Cylinders, etc., we can furnish them of any pitch, length or pattern.

☞ Old Machinery Renewed or Repaired—and Estimates for Work in any part of the United States furnished at short notice.

June 8, 1849.

Iron Wire.

REFINED IRON WIRE OF ALL KINDS, Card, Reed, Cotton-flyer, Annealed, Broom, Buckle, and Spring Wire. Also all kinds of Round, Flat or Oval Wire, best adapted to various machine purposes, annealed and tempered, straightened and cut any length, manufactured and sold by

ICHABOD WASHBURN.

Worcester, Mass., May 25, 1849.

American and Foreign Iron.

FOR SALE,

300	Tons	A 1, Iron Dale Foundry Iron.
100	"	1, " " "
100	"	2, " " "
100	"	" Forge "
400	"	Wilkesbarre " "
100	"	"Roaring Run" Foundry Iron.
300	"	Fort " "
50	"	Catoctin " "
250	"	Chikiswalungo " "
50	"	"Columbia" "chilling" iron, a very superior article for car wheels.
75	"	"Columbia" refined boiler blooms.
30	"	1 x ¼ Slit iron.
50	"	Best Penna. boiler iron.
50	"	"Puddled" "
50	"	Bagnall & Sons refined bar iron.
50	"	Common bar iron.

Locomotive and other boiler iron furnished to order.

GOODHUE & CO.,

New York. 64 South street

American Pig, Bloom and Boiler Iron.

HENRY THOMPSON & SON,

No 57 South Gay St., Baltimore, Md.,

Offer for sale, *Hot Blast* Charcoal *Pig Iron* made at the *Catoctin* (Maryland), and *Taylor* (Virginia), *Furnaces; Cold Blast* Charcoal Pig Iron from the *Cloverdale* and *Catawba*, Va., Furnaces, suitable for *Wheels* or *Machinery* requiring *extra* strength; also *Boiler* and *Flue Iron* from the mills of Edge & Hilles in Delaware, and *best quality Boiler Blooms* made from *Cold Blast Pig Iron* at the *Shenandoah Works*, Va. The productions of the above establishments can always be had at the lowest market prices for approved paper.

American Pig Iron of other brands, and *Rolled* and *Hammered Bar Iron* furnished at lowest prices. Agents for *Watson's Perth Amboy Fire Bricks*, and Rich & Cos. New York Salamander Iron Chests.

Baltimore, June 14, 1849. 6 mos

Wheel, Forge and Foundry Iron.

LOCUST GROVE Wheel Iron of great strength and superior chilling property.

Balt. Charcoal Forge Iron, from Patuxent, Curtis Creek and Gunpowder furnaces.

Elkridge Foundry Iron, of superior strength and softness. Anthracite and Charcoal Iron from Pennsylvania and Virginia. Gas and Water Pipes, Lamp Posts from Elkridge furnace.

LEMMON & GLENN,

6m9 62 Buchanan's Wharf, Baltimore.

Iron.

THE SUBSCRIBERS having resumed the agency of the New-Jersey Iron Company, are prepared to execute orders for the different kinds and sizes of Iron usually made at the works of the company, and offer for sale on advantageous terms.—

150	tons	No. 1 Boonton Foundry Pig Iron.		
100	"	No. 2	do.	do.
300	"	Nos. 2 & 3 Forge	do.	do.
100	"	No. 2 Glendon	do.	do.
140	"	Nos. 2 & 3 Lehigh Crane	do	do.
100	"	No. 1 Pompton Charcoal		do.
100	"	New-Jersey Blooms		
50	"	New-Jersey Faggoting Iron, for shafts		

Best Bars, ¼ to 4 inch by ¼ to 1 inch thick.
Do do Rounds and Squares, ⅜ to 3 inch.
Rounds and Squares, 3-16 to 1 inch.
Half Rounds, ½ to 1 in. Ovals & Half Ovals ½ to 1¼ in.
Bands, 1¼ to 4 inch. Hoops, ⅜ to 2 inch.
Trunk Hoops, ¾ to 1½ in. Horse Shoe & Nut Iron.
Nail Plates. Railroad Spikes.

DUDLEY B. FULLER & Co., 139 Greenwich-st. and 85 Broad-st.

WILLIAM JESSOP & SONS'

CELEBRATED CAST-STEEL.

The subscribers have on hand, and are constantly receiving from their manufactory,

PARK WORKS, SHEFFIELD,

Double Refined Cast Steel—square, flat and octagon.
Best warranted Cast Steel—square, flat and octagon.
Best double and single Shear Steel—warranted.
Machinery Steel—round.
Best and 2d gy. Sheet Steel—for saws and other purposes.
German Steel—flat and square, "W. I. & S." "Eagle" and "Goat" stamps.
Genuine "Sykes," L Blister Steel.
Best English Blister Steel, etc., etc., etc.

All of which are offered for sale on the most favorable terms by WM. JESSOP & SONS,

91 John street, New York.

Also by their Agents—

Curtus & Hand, 47 Commerce street, Philadelphia.
Alex'r Fullerton & Co., 119 Milk street, Boston.
Stickney & Beatty, South Charles street, Baltimore.

May 6, 1848.

JOHNSON, CAMMELL & Co's Celebrated Cast Steel,

AND

ENGINEERING AND MACHINE FILES,

which for quality and adaptation to mechanical uses, have been proved superior to any in the United States. Every description of square, octagon, flat and round cast steel, sheet, shovel and railway spring steel, best double and single shear steel, German steel, flat and square, goat stamps, etc. Saw and file steel, and steel to order for any purposes, manufactured at their Cyclops Steel Works Sheffield.

JOHNSON, CAMMELL & CO.,

100 William St., New York.

November 23 1849.

Railroad Iron.

OF ANY PATTERN AND WEIGHT,

Of a Favorite Brand,

And deliverable in Bond, or Duty paid, at any Port of the U. S., contracted for on favorable terms, by

CHARLES ILLIUS,

20 Beaver St., New York.

Pig and other Iron also contracted for. Sole Agent for "*Baxter's Machine and Burning Oil*"—particularly adapted for "*Railroads*" and other Machinery—Preferred to Sperm by the many now using it, and 25 *per cent. cheaper.*

CUT NAILS OF BEST QUALITY, BAR IRON (including Flat Rails) manufactured and for sale by FISHER, MORGAN & CO.,

75 N. Water St., Philadelphia.

Ogden & Martin's ROSENDALE CEMENT.

WE are prepared to enter into arrangements for supplying our Cement for public works or other purposes. We warrant the cement equal in every respect to any manufactured in this country. It attains a great degree of hardness, setts immediately under water, and is a superior article for masonry coming in contact with water, or requiring great strength.

For sale in tight barrels, well papered, at their office by OGDEN & MARTIN, 104 Wall st.

February 16, 1850. 1y*

The above cement is used in most of the fortifications building by government.

To Steam Engine Builders.

THE Undersigned offer for sale, *at less than half its cost*, the following *new machinery*, calculated for an engine of 62 inches cylinder and 10 feet stroke, viz.

2 Wrought Iron Cranks, 60 inches from centre to centre.
1 Do. do. Connecting Rod Strap.
2 Do. do. Crank Pins.
1 Eccentric Strap.
1 Diagonal Link with Brasses.
1 Cast Iron Lever Beam (forked).

The above machinery was made at the West Point Foundry for the U. S. Steamer Missouri, without regard to expense, is all finished complete for putting together, and has never been used. Drawings of the cranks can be seen on application to

HENRY THOMPSON & SON,

No. 57 South Gay St., Baltimore, Md.

Sept. 12, 1849.

8,000 Tons Railroad Iron.

THE OHIO AND PENNSYLVANIA RAILROAD CO. wish to contract for eight thousand tons of Railroad Iron, for the eastern division of their road, extending westward from Pittsburgh. Three thousand tons to be delivered on the Ohio river at Pittsburgh and Beaver, before the close of canal navigation in the present year, 1850; and the remainder in the spring of next year. The rails are to be of the H pattern, in lengths of 20 feet, and are to weigh 60 lbs. per lineal yard. They are to be subject to the inspection of Solomon W. Roberts, Chief Engineer.—For further particulars address the President of the Company at Pittsburgh.

By order of the Board of Directors.

WM. ROBINSON, Jr., President.

S. S. Keyser & Co., IRON WAREHOUSE,

Corner of South and Pratt Streets,

BALTIMORE, MD.

Selling Agents for the Rough and Ready Bar Iron and Elk Boiler and Flue Iron Rolling Mills, Sarah and Taylor Furnaces, and Wrightsville Hollow Ware Foundry, and Dealers in Bar and Sheet Iron, and Cast, Sheer, German, Blister, Spring and Electerised Steel, etc., etc.

Smith & Tyson,

GENERAL COMMISSION MERCHANTS,

No. 25 South Charles St., Baltimore, Md.

AGENTS for the Celebrated Columbia Pig Iron, suitable for Car Wheels and Chilled Rolls.

Columbia refined Charcoal Blooms; Refined Charcoal Juniatta Billet Iron for Wire; Refined Iron for Bridging, of great strength; Cut Nails, Spikes, and Brads; Railroad Spikes and Wrought Chairs. 22tf

To Railroad Companies and Contractors.

FOR SALE.—Two Locomotive Engines and Tenders, at present in use on the Beaver Meadow Railroad, being too light for their coal trains, but well calculated for either gravel or light passenger trains.

They weigh, in running order, about 8 tons each—having one pair of driving wheels 4 feet diameter, 4 truck wheels 30 inches diameter, with cylinders 10 in. diameter, and 18 inches stroke of piston. Tenders on 4 wheels. Address JAMES ROWLAND,

Prest. Beaver Meadow Railroad & Coal Co.,

Philadelphia.

or, L. CHAMBERLAIN, Sec'y,

at Beaver Meadow, Pa.

May 19, 1849. 20tf

Railroad Instruments.

THEODOLITES, TRANSIT COMPASSES, and Levels, with Fraunhoffers Munich Glasses, Surveyor's Compasses, Chains, Drawing Instruments, Barometers, etc., all of the best quality and workmanship, for sale at unusually low prices, by

E. & G. W. BLUNT,

No. 179 Water St., cor. Burling Slip.

New York, May 19, 1849.

Rosendale Cement.

THE NEWARK AND ROSENDALE LIME AND CEMENT CO. are now manufacturing at their works in NEWARK, N. J., and Ulster county, N.Y., a very superior article of *Hydraulic Cement*—also Lime Calcine Plaster, etc. Contractors and dealers will find it to their advantage to call or make application before purchasing elsewhere. All communications addressed to the subscriber, at Newark, N.J., will be punctually attended to.

1y*15 HENRY WILDE, Secretary.

Patent India Rubber Steam Packing.

THIS article, made by the subscriber, who alone is authorised to make it, is warranted to stand as high a degree of heat *as any that has been or can be made by any person*—and is the article which has made the reputation of India Rubber Steam Packing and the demand therefor. A large assortment of all thicknesses requisite for any description of engines, steam pipes, valves, etc., constantly on hand and for sale by the manufacturer and patentee, who will give every information regarding its properties, mode of use, etc. at the warehouse. JOHN GREACHEN, JR., 98 Broadway, opposite Trinity Church.
New York, October, 1849.

Passenger Car Linings.

THE Advertiser continues to make to order the Enamelled Car Linings which have been so highly approved the last three years, and are now exclusively used by all the Northern Railroads. No pains are spared to get out new styles, and adapt them to the tastes of every consumer.
Orders addressed to CHARLES STODDER, No. 75 Kilby street, Boston, will have prompt attention.
March 23, 1850. 2m

CAUTION.

RAILROAD COMPANIES and others are hereby cautioned against using or vending our improvement for easing the lateral motion as applied on Railroad Cars. Letters Patent having been granted to us in 1841, any party or parties so making or using said improvement without license from us will be proceeded against according to law.
DAVENPORT & BRIDGES.

P. H. Griffin,

Corner of Steuben and James Sts. Albany, N.Y.,
CONTINUES to manufacture copper flues for locomotive boilers, brewers' coppers, stills, tanner heaters, etc. Copper work in general, at the shortest notice. He has constantly on hand brass cocks, brass valves, copper pumps of every variety.
Orders promptly attended to. 1y14

FOWLER M. RAY'S Patent India-rubber Railroad CAR SPRING.

New York and Erie Railroad Shops.
Piermont, March 26, 1850.
This will certify that from practical experience in the use of Fowler M. Ray's India rubber Car Springs, I believe them to be far superior to any others now in use.
I have never known them to be affected by any change of temperature, as other Rubber Springs have been affected on this road.
I am at the present time repairing a Passenger Car that Mr. Ray and myself mounted with his springs about two years and eight months since.
The springs are at the present time as perfect, to all appearances, as when first applied to the car.
Respectfully yours,
HORACE B. GARDNER,
Foreman of the Car Shops.

—

Supt. Office N.Y. & H. R.R.,
New York, March 8, 1850.
This is to certify that we have used the Rubber Springs manufactured by Mr. F. M. Ray for the past twenty months, "both for Passenger and Freight Car Springs and Bumpers, and of different sizes," and have in every case given entire satisfaction, and I consider them the best spring now in use.
M. SLOAT, Supt.

—

Harlem R.R. Depot,
New York, March 7, 1850.
This is to certify that we have used Mr. F. M. Ray's India-rubber Springs for over eighteen months, and find them to be easy and durable, and recommend them to railroad companies as being superior to anything we have tried.
J. M. SMART,
Foreman at 42d St. Depot.

—

Office New Jersey Railroad Co.,
Jersey City, March 8, 1850.
FOWLER M. RAY, Esq.,
Dear Sir: In answer to your enquiries respecting the operation of the Vulcanised Rubber Springs, purchased by our company from you some two years since, I reply that they are superior to any spring in use, (that I have either seen or heard of).
The improved form of your spring, consisting of a solid piece of vulcanised rubber with bands on the outside, is far superior to your first form, consisting of disks of rubber with metallic plates interposed.
The last named form was tried, if you recollect, at a much earlier period; and then was replaced by your last form.
I have no hesitation in saying that your springs have given entire satisfaction, and most cheerfully recommend them to railroad companies throughout the country for the following reasons:
1st. The cost is 30 per cent. less.
2d. Saving of weight on each car of 8 wheels from 700 to 800 lbs.
3d. Less care and attention is required, as they are not liable to get out of repair.
4th. A great saving is secured in the wear and tear of the cars and rails from their great elasticity.
5th. The freedom from noise.
6th. There is greater safety in case of accident, as they cannot be broken.
7th. The comfort of passengers is enhanced sufficiently to pay the expense, waiving all the other reasons that I have given.
Should this fail to satisfy any person enquiring, you are at liberty to refer to me, No. 150 Washington St., Jersey City. Yours respectfully,
T. L. SMITH, Supt.

—

New York, March 11, 1850.
I have used the Patent India-rubber Spring purchased of Mr. Ray, upon the cars of the New York and New Haven Railroad, and have found them efficient and economical; and when applied to the axles and draw springs, believe them to be quite equal to any in use. I have found a combination of these springs with a steel spring under the transom beam a very satisfactory arrangement, and am now using this plan in all new cars. Yours respectfully,
ROBERT SCHUYLER.

—

February 25, 1850.
From practical observation of the use of the India-rubber Car Springs, manufactured and sold by your company, we are entirely satisfied in their application, and do not hesitate to recommend them as elastic, durable, requiring no repairs for years, and retaining their consistency during all extremes of weather. We have applied them for the past two years, and consider them superior for all railroad purposes.
Yours truly,
OSGOOD BRADLEY, Car Builder, Worcester.
T. & C. WASON, do. Springfield.
DEAN, PACKARD & MILLS, do. do.
DAVENPORT & BRIDGES, do. Cambridgeport.

—

Office of the New Jersey Railroad Co.,
Jersey City, March 7, 1850.
This is to certify that we have had Mr. F. M. Ray's India-rubber Springs in constant use under our cars, and as Bumper Springs for upwards of two years, and they have in every way given perfect satisfaction.
The present form of spring we deem far superior to the form of Disk, having used both forms, although we have none of those made in Disks at present in use.
We take pleasure in recommending these springs to all railroad companies.
J. P. JACKSON, Vice Prest.
New Jersey Railroad and Trans. Co.

—

Roxbury, February 28, 1850.
In compliance with your request, I take great pleasure in stating the result of my experience in the use of "Ray's Patented Vulcanised India-rubber Car and Engine Springs." We have used them nearly two years, and never had one fail in any way. The *cold weather* does not affect *them*, as it has *other* rubber springs we have used.
With sixteen years' experience as superintendent of machinery on the Boston and Providence railroad, I take pleasure in saying that your springs are the best we ever used, or I ever saw used elsewhere. We have 20 cars rigged with them, of which I can say that the springs are as good now as when first applied. I put 24 lbs. of the rubber under the forward end of one of our heaviest engines, taking off 250 lbs. of steel springs—it has been in use 18 months, and is in as good condition now as when first put under the engine.
Very respectfully yours,
GEO. S. GRIGGS,
Supt. of Machinery, Boston and Prov. R.R.

—

Fall River, February 2, 1850.
In answer to yours of the 20th ult. I would say that this company has for some 10 or 12 months past been using "Ray's India-rubber Springs." We have applied them to both passenger and freight cars with uniform success. They have invariably preserved their elasticity and consistency through all the extremes of weather; and we are now applying them whenever the steel spring fails. I am well satisfied that they are particularly adapted for railroad purposes.
Very respectfully yours,
GEO. HAVEN,
Supt. Fall River Railroad.

—

Jersey City, March 9, 1850.
This is to certify that the present form of Mr. F. M. Ray's India-rubber Car Spring I consider far superior to the form of Disk, having used both forms.
I take pleasure in recommending these springs to all railroad companies. DAVID H. BAKER,
Foreman of Car Shop of N.J. R.R. & Trans. Co.

—

Boston, March 5, 1850.
In answer to your enquiry about India-rubber Springs, I have to say that we have used them to a considerable extent on both freight and passenger cars, and also on several of our tenders; and I am very well satisfied that they answer all the purposes for which they are intended. I believe the India-rubber will soon supersede all other springs for cars and tenders. Yours truly, S. M. FELTON,
Supt. Fitchburg Railroad.

—

Old Colony Railroad Office,
Boston, March 6, 1850.
EDWARD CRANE, Esq.,
President New England Car Co.,
Dear Sir: In compliance with your request I would state that the Old Colony Railroad Comp'y have had in use upon their road, India-rubber Springs furnished by your company, for more than eighteen months past, during which time they have been extensively used under Passenger and Freight Cars, Locomotive Tenders, and for Drawer and Buffing Springs, with the most perfect success. The elasticity and consistency of the Rubber has never been unfavorably affected by either extremes of heat or cold—and from the experience which we have had in the use of Rubber Springs, I think them well adapted for railroad purposes—and therefore we have for some months past used Rubber almost exclusively, in all places where springs are required.
Respectfully yours, etc.,
JAS. H. MOORE,
Supt. O. C. Road.

—

Troy, February 27, 1850.
We have been using your India-rubber Car Springs for nearly two years—and we take pleasure in saying that in our opinion the rubber has to a certain extent already, and may eventually entirely supersede all other Springs for Railroad Car purposes. We now use it entirely for Draw Springs and Bumpers, considering it better and lighter than steel.
During our two years' experience in the use of it, we have not known any to lose their elasticity, or fail in any way; and we cheerfully recommend the rubber for railroad car springs. Very respectfully,
EATON, GILBERT & CO.

To Practical Machinists.

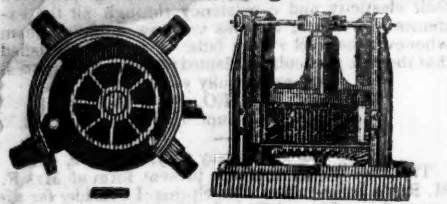
AN excellent opportunity now occurs to a practical Machinist, of WELL ESTABLISHED REPUTATION, and some capital, to engage extensively in the STEAM ENGINE, BOILER AND FOUNDRY BUSINESS.
An establishment is now ready for business, ample in all its details, including extensive wharf room, for any sized steamboats, and from its position, if properly conducted, will doubtless command a large share of business.
A practical Machinist, as a partner is required, to conduct the whole establishment: and only those FULLY COMPETENT need apply. Address (post paid) "MACHINE CO.," Box No. 741, Philadelphia, Pa.
1m14

Etna Safety Fuse.

THIS superior article for igniting the charge in wet or dry blasting, made with DUPONT'S best powder, is kept for sale at the office and depot of
REYNOLDS & BROTHER,
☞ *Sole Manufacturers,* ☜
No. 85 Liberty St.
NEW YORK.
And in the principal cities and towns in the U. States.
☞ The Premium of the AMERICAN INSTITUTE was awarded to the *Etna Safety Fuse* at the late Fair held in this city.
November 3, 1849. 1y

MACHINERY.

Henry Burden's Patent Revolving Shingling Machine.



THE Subscriber having recently purchased the right of this machine for the United States, now offers to make transfers of the right to run said machine, or sell to those who may be desirous to purchase the right for one or more of the States.

This machine is now in successful operation in ten or twelve iron works in and about the vicinity of Pittsburgh, also at Phœnixville and Reading, Pa., Covington Iron Works, Md., Troy Rolling Mills, and Troy Iron and Nail Factory, Troy, N. Y., where it has give universal satisfaction.

Its advantages over the ordinary Forge Hammer are numerous: considerable saving in first cost; saving in power; the entire saving of shingler's, or hammersman's wages, as no attendance whatever is necessary, it being entirely self-acting; saving in time from the quantity of work done, as one machine is capable of working the iron from sixty puddling furnaces; saving of waste, as nothing but the scoria is thrown off, and that most effectually; saving of staffs, as none are used or required. The time required to furnish a bloom being only about six seconds, the scoria has no time to set, consequently is got rid of much easier than when allowed to congeal as under the hammer. The iron being discharged from the machine so hot, rolls better and is much easier on the rollers and machinery. The bars roll sounder, and are much better finished. The subscriber feels confident that persons who will examine for themselves the machinery in operation, will find it possesses more advantages than have been enumerated. For further particulars address the subscriber at Troy, N. Y. P. A. BURDEN.

Railroad Spikes and Wrought Iron Fastenings.

THE TROY IRON AND NAIL FACTORY, exclusive owner of all Henry Burden's Patented Machinery *for making Spikes*, have facilities for manufacturing large quantities upon short notice, and of a quality unsurpassed.

Wrought Iron Chairs, Clamps, Keys and Bolts for Railroad fastenings, also made to order. A full assortment of Ship and Boat Spikes always on hand.

All orders addressed to the Agent at the Factory will receive immediate attention.

P. A. BURDEN, *Agent*,
Troy Iron and Nail Factory, Troy, N. Y.

RAILROAD WHEELS.

CHILLED RAILROAD WHEELS.—THE UNdersigned are now prepared to manufacture their Improved Corrugated Car Wheels, or Wheels with any form of spokes or discs, by a new process which prevents all strain on the metal, such as is produced in all other chilled wheels, by the manner of casting and cooling. By this new method of manufacture, the hubs of all kinds of wheels may be made whole—that is, without dividing them into sections—thus rendering the expense of banding unnecessary; and the wheels subjected to this process will be much stronger than those of the same size and weight, when made in the ordinary way.

A. WHITNEY & SON,
Willow St., below 13th,
Philadelphia, Pa.

CHILLED RAILROAD WHEELS.—THE UNdersigned, the *Original Inventor* of the *Plate Wheel* with solid hub, is prepared to execute all orders for the same, promptly and faithfully, and solicits a share of the patronage for those kind of wheels which are now so much preferred, and which he originally produced after a large expenditure of time and money.

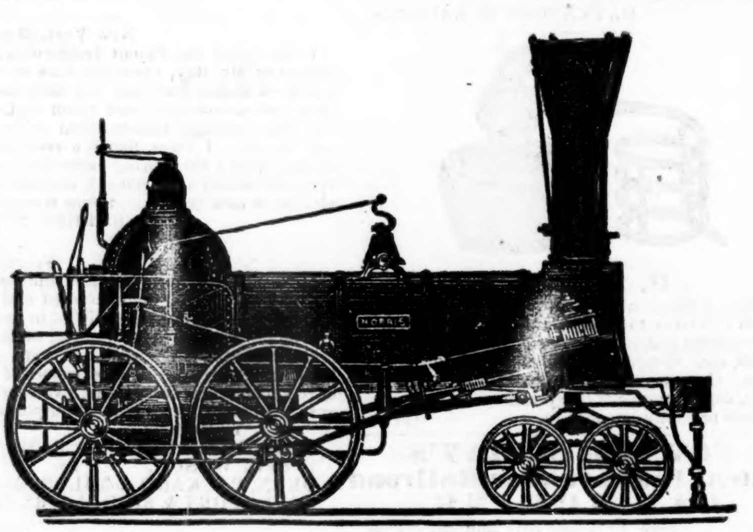
A. TIERS,
Point Pleasant Foundry.

He also offers to furnish Rolling Mill Castings, and other Mill Gearing, with promptness, having, he believes, the largest stock of such patterns to be found in the country. A. T.

Kensington, Philadelphia Co., *March 12, 1848.*

NORRIS' LOCOMOTIVE WORKS.

BUSHHILL, SCHUYLKILL SIXTH-ST., PHILADELPHIA,



THE UNDERSIGNED Manufacture to order Locomotive Steam Engines of any plan or size. Their shops being enlarged, and their arrangements considerably extended to facilitate the speedy execution of work in this branch, they can offer to Railway Companies unusual advantages for prompt delivery of Machinery of superior workmanship and finish.

Connected with the Locomotive business, they are also prepared to furnish, at short notice, Chilled Wheels for Cars of superior quality.

Wrought Iron Tyres made of any required size—the exact diameter of the Wheel Centre, being given, the Tires are made to fit on same without the necessity of turning out inside.

Iron and Brass castings, Axles, etc., fitted up complete with Trucks or otherwise.

NORRIS, BROTHERS

LAWRENCE'S ROSENDALE HYDRAULIC Cement. This Cement is warranted equal to any manufactured in this country, and has been pronounced superior to Francis' "Roman." Its value for Aqueducts, Locks, Bridges, Flooms, and all Masonry exposed to dampness, is well known, as it sets immediately under water, and increases in solidity for years.

For sale in lots to suit purchasers, in tight papered barrels, by JOHN W. LAWRENCE,
142 Front-street, New York.

☞ Orders for the above will be received and promptly attended to at this office. 32 1y.

PATENT MACHINE MADE HORSE-SHOES.

The Troy Iron and Nail Factory have always on hand a general assortment of Horse Shoes, made from Refined American Iron.

Four sizes being made, it will be well for those ordering to remember that the size of the shoe increases as the numbers—No. 1 being the smallest.

P. A. BURDEN, *Agent*,
Troy Iron and Nail Factory, Troy, N. Y.

COLUMBUS, OHIO,

Railroad Car Manufactory. RIDGWAYS & KIMBALL,

HAVE established at this central point, the manufacture of Passenger, Freight, Gravel and Hand Cars for Railroads, and assure all Western Railroad Companies that it will be their constant aim to procure the best materials and workmen, and to turn out the best kind of work at fair prices. Specimens may be seen on the Columbus and Xenia Railroad. The patronage of Railroad Companies is respectfully solicited. 1y8

To Inventors and Patentees.

OWEN G WARREN, ARCHITECT, Has had many years' experience as Agent for obtaining Patents, both in this country and Europe, and will transact such business promptly and reasonably. Persons at a distance can have their business done by correspondence—without the necessity of visiting this city or Washington. Office No. 94 Merchants Exchange, Wall st., corner of Hanover st., up stairs. 1y3